VOLUME 1, NUMBER 4

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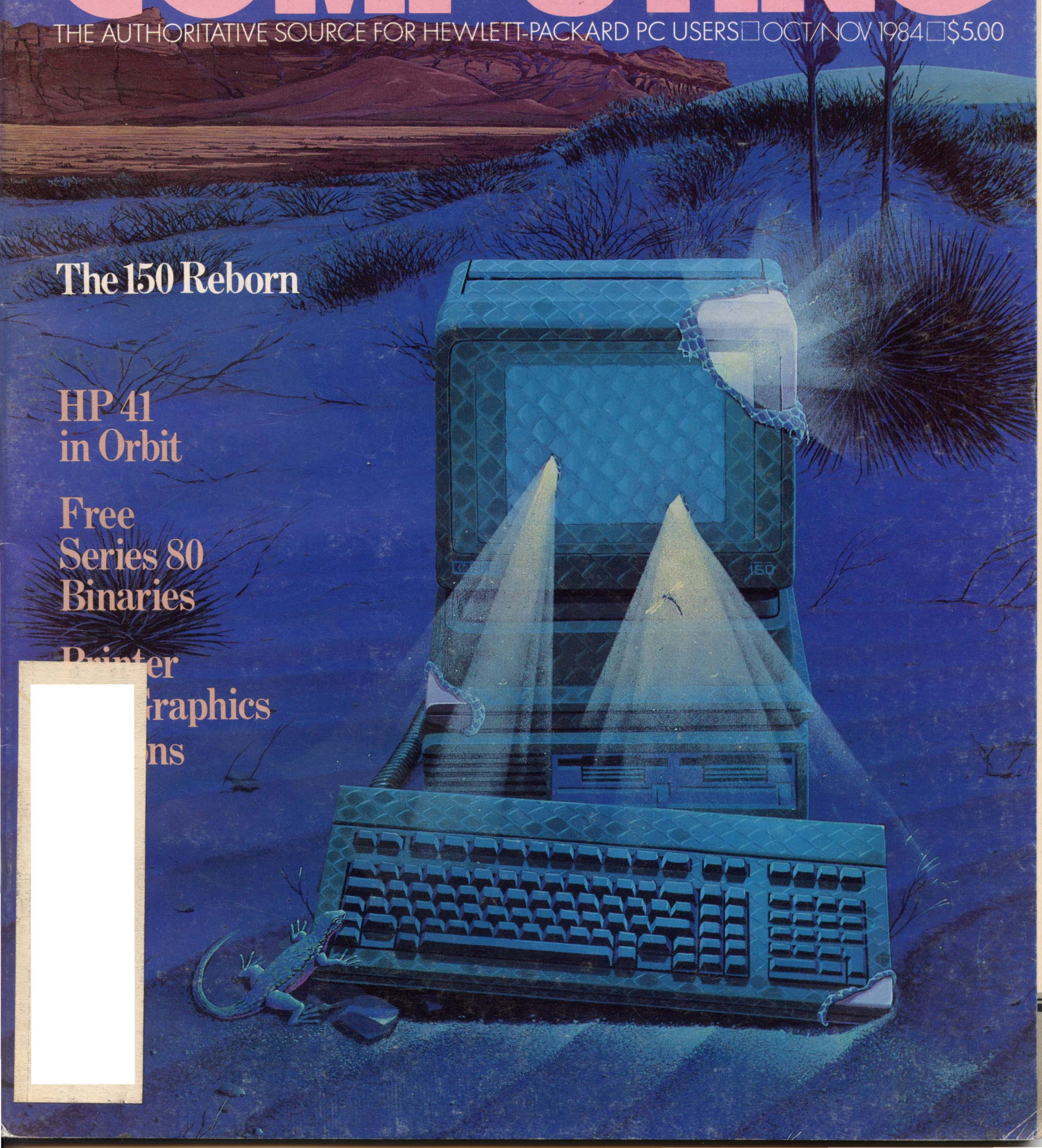

The 150 Reborn

HP 41 in Orbit

Free Series 80 Binaries

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Printer

Graphics

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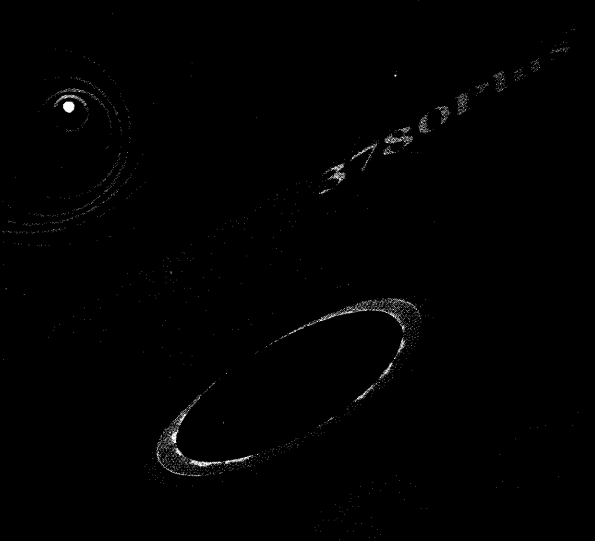
CLEO makes the MAINFRAME connection



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- ⏢ Simultaneously use alternate key.
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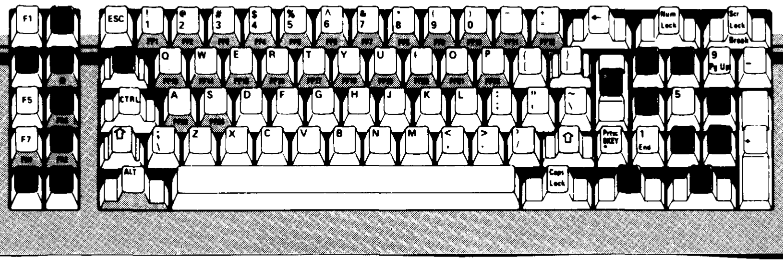
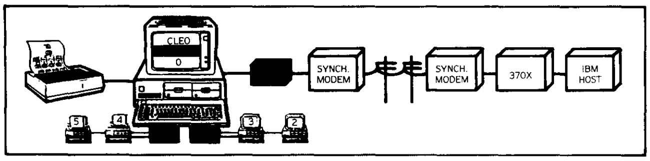


IBM PC COMPATIBLES

CLEO on the IBM PC Compatibles. The CLEO software program loads from a PC-DOS diskette and contains simultaneous emulation for 3276 line protocol and up to six devices emulating 3278 crts or 3287 printers. When CLEO runs on the PC, six devices are supported (through three interface cards supplied with the CLEO software). The six supported devices include: 3278 support for the PC's console; 3287 support for the PC's printer; and, 3278 support for up to four other PC's which may be serially attached to the PC which is running CLEO.

CLEO is a full 3276 emulator and supports all of the standard features of IBM's 3276; you won't need to make any modifications to your 3270 host computer. Your installation considerations for CLEO on the PC will be identical to those experienced in installing an IBM 3276. In fact, CLEO on your PC will readily install at any site where a 3276 currently operates.

Keyboard decals are supplied with CLEO. These adhere to the front face of the keys on your PC keyboard and serve as a quick reminder of the location of the 3278 keys.



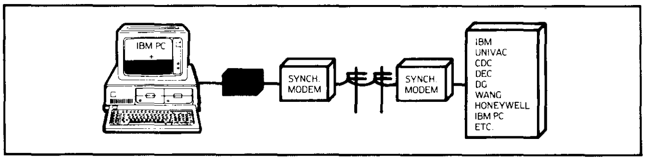
BSC and SNA versions of CLEO are available in two models. The first version is PC2 which provides 3276 emulation and support for two devices, a 3278 CRT and a 3287 printer. PC2 includes one hardware support card (PC-SIC).

The expanded or "clustered" model is called PC6. PC6 requires two additional interface cards (PC-AIC) and four 25′ cables for attaching four PC's to a central PC running PC6. Physically these four PC's are attached through their asynchronous serial port (COMM1) using a 25′ cable included in the PC6 package.

When you're operating one of the four attached PC's and you want your PC to become a 3278 you execute a software package, PC3278, included with the PC6 package.

For enhanced 3278 display, the IBM color graphics card is recommended for use with CLEO.

3780Plus on the IBM PC Compatibles. 3780Plus Software is self-contained on one floppy disk and menu driven with simple commands so that you need not be an "expert" in 3780 or 2780 communications to use the package. 3780Plus for the PC includes an interface card, SIC, for interfacing to your synchronous modem.



3780Plus supports IBM's 2780 and 3780 BSC protocols for computer-to-host or computer-to-computer high speed communications. Additionally, 3780Plus has special new features for talking to other computers which are running 3780Plus. For example, files are automatically named by the receiving computer to their original name on the transmitting computer.

3780Plus allows maximum flexibility with a "System" command which allows you to execute many PC-DOS commands from within 3780Plus.

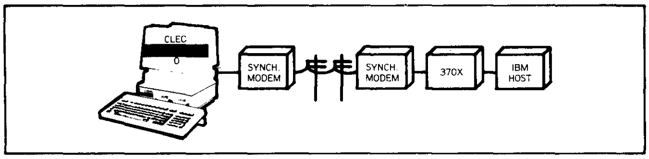
Software/ Hardware Model	Description	3270 Devices Supported	Interface Cards	Retail Price
PC2-3276/2SHM	3276 BSC for the PC	2	1	$ 795.
PC2-3276/12SHM	3276 SNA for the PC	2	1	$ 895.
PC6-3276/2SHM	3276 BSC cluster for PC	6	2	$1,349.
PC6-3276/12SHM	3276 SNA cluster for PC	6	2	$1,499.
PC-3780PlusSHM	3780/2780 emulation for PC		1	$ 795.

HP-150

CLEO on the HP-150. The CLEO software program loads from a MsDos diskette and contains simultaneous emulation for 3276/2 BSC line protocol and support for two devices, a 3278 crt and 3287 printer.

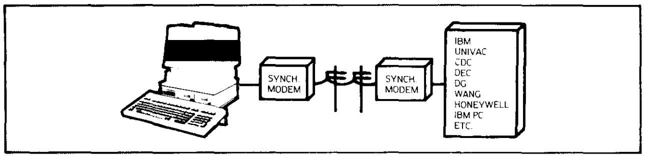
CLEO is a full 3276/2 emulator and supports all of the standard features of IBM's 3276/2; you won't need to make any modifications to your 3270 host computer. Your installation considerations for CLEO on the HP-150 will be identical to those experienced in installing an IBM 3276/2. In fact, CLEO on your 150 will readily install at any site where a 3276/2 currently operates.

Unlike a 3270 coax product, CLEO needs no additional hardware on the HP-150 and an IBM cluster controller to support a coax connection is not required. CLEO is a 3276/2 cluster controller and hooks to a synchronous modem in the same fashion as an IBM 3276/2. The HP-150's port 1 is used for the modem connection.



Keyboard decals are supplied with CLEO. These adhere to the front face of the keys on your 150 keyboard and serve as a quick reminder of the location of the 3278 keys.

3780Plus on the HP-150. 3780Plus Software is self-contained on one floppy disk and menu driven with simple commands so that you need not be an "expert" in 3780 or 2780 communications to use the package.



3780Plus supports IBM's 2780 and 3780 BSC protocols for computer-to-host or computer-to-computer high speed communications. Additionally, 3780Plus has special new features for talking to other computers which are running 3780Plus. For example, files are automatically named by the receiving computer to their original name on the transmitting computer.

3780Plus allows maximum flexibility with a "System" command which allows you to execute many MsDos commands from within 3780Plus.

The HP-150's port 1 is used to connect to the synchronous modem.

Software Model	Description	Retail Price
HP-3276/2SM	3270 BSC for HP-150	$500.
HP-3780PlusSM	3780/2780 emulation for HP-150	$500.

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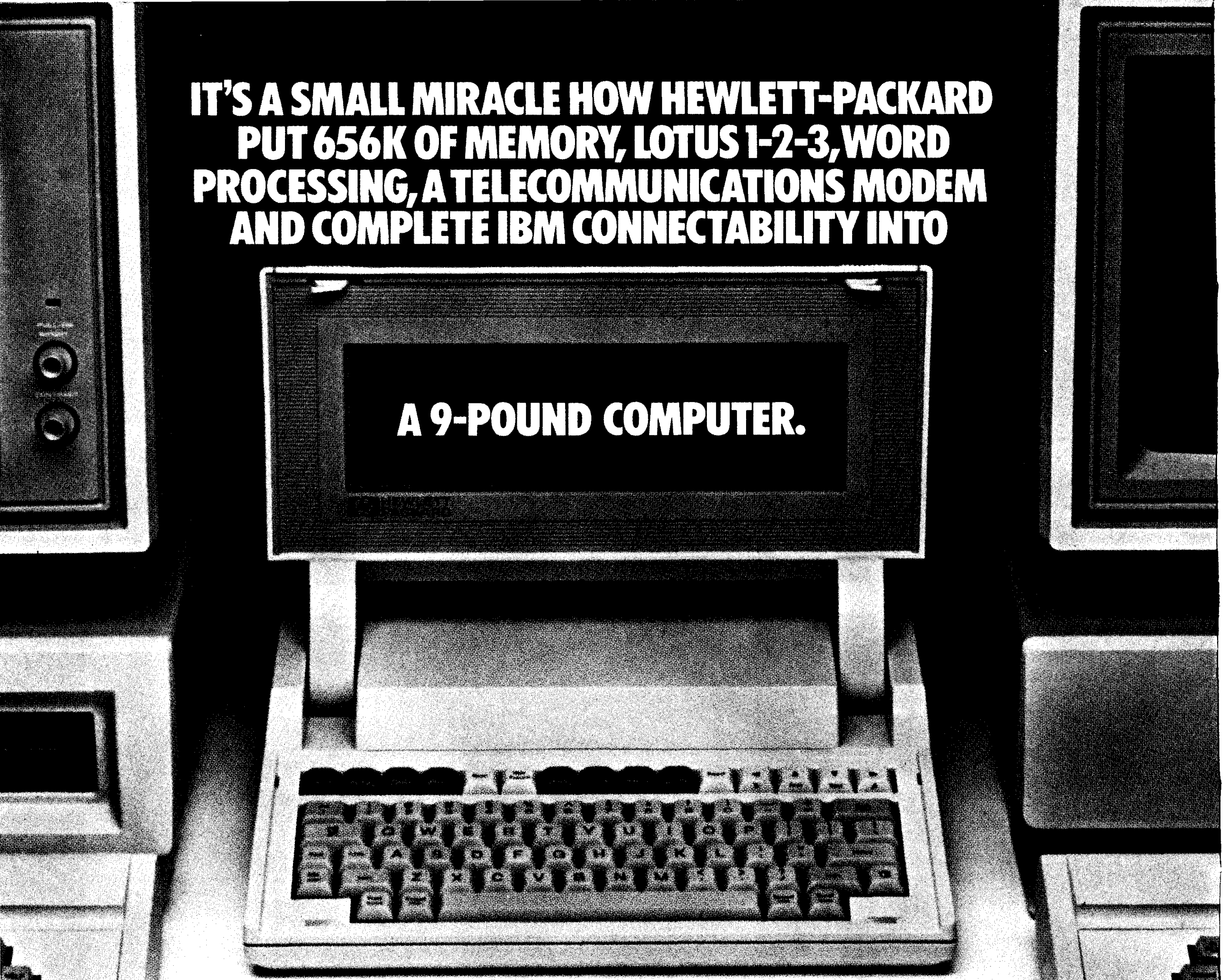
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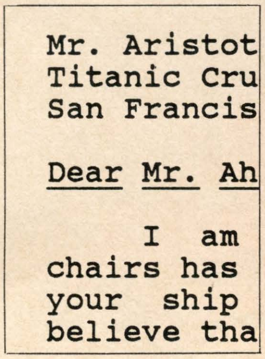

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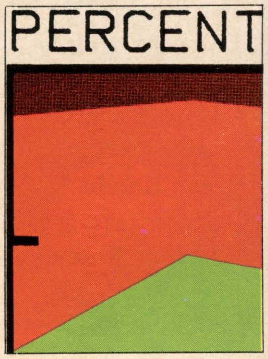

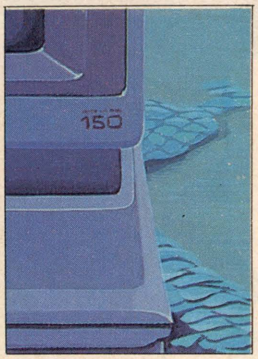

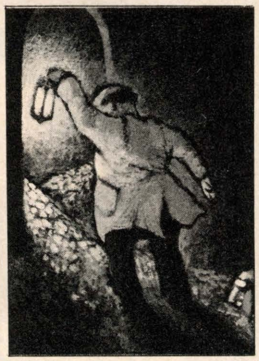

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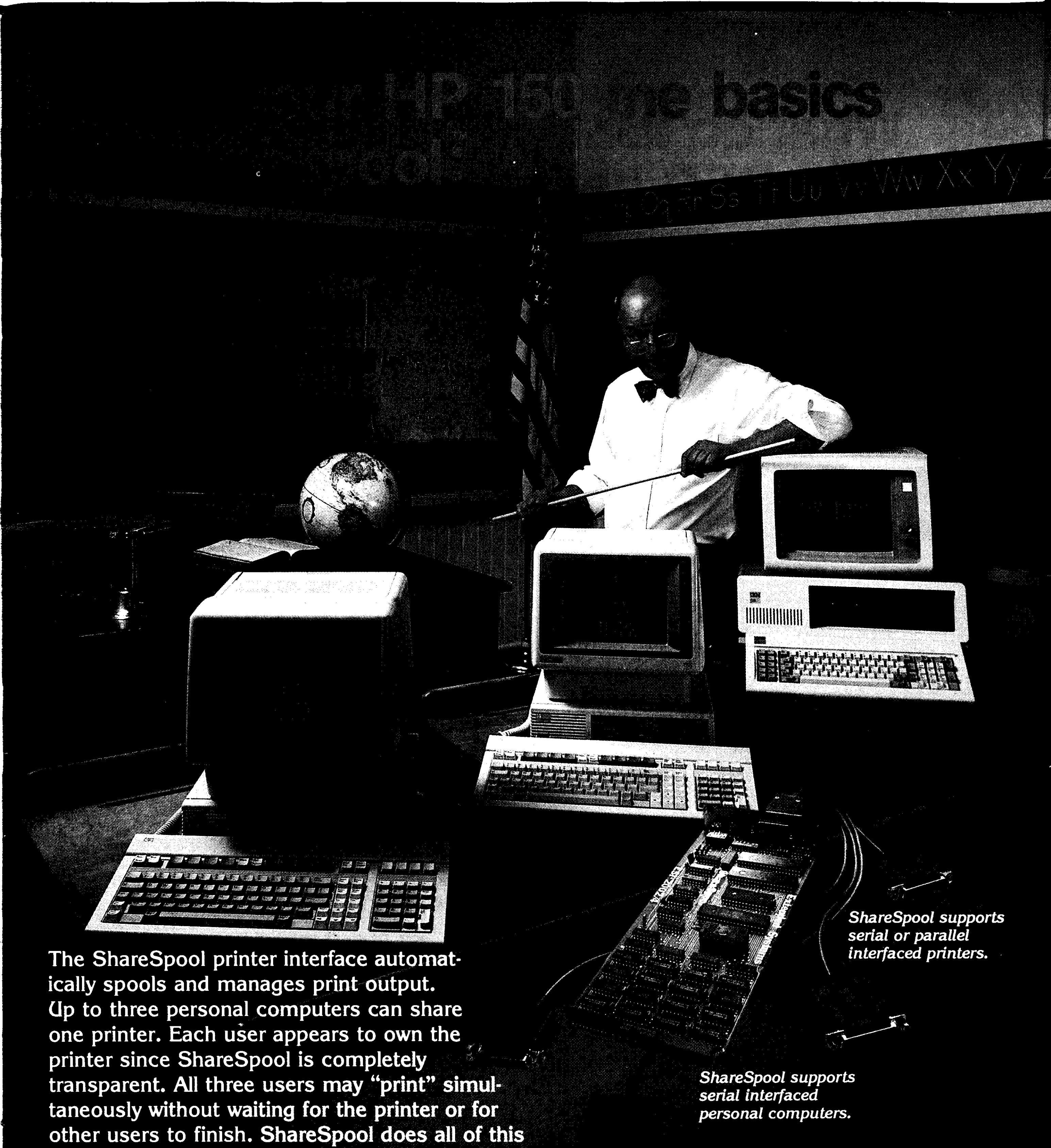

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PROFILE

Proud parent in Corvallis

BY TOM HAGER

Janet Placido is a proud parent. She can talk for hours about her baby—all the things she's taught it, how much smarter it is than other kids its size. Her enthusiasm shows in her face, always intense, often smiling.

But Placido's newborn is not just any kid. It gestated for five years, talks in Basic and does 6 by 6 matrix inversions in 2.5 seconds. It's small enough to cradle in one hand and loves to have its keyboard tickled. Its given name is HP Model 71B, but the beaming parents nicknamed it Titan.

The birth of the 71B was a joyous event, especially for Placido, who was a driving force in the design of its operating system. At 32, this dynamic, straight-talking computer scientist is already a project manager, who supervised a team of software engineers devoted to making the 71B the most powerful, most adaptable, most user-friendly handheld ever created.

Placido's "office" on the second floor of HP's Corvallis complex is a tiny cubicle lost amid a hundred others in a room the size of a football field. The only dividers are shoulder-high partitions. This is the design center, the brain shop where tomorrow's HP calculators and small computers take shape.

The walls of Placido's office are lined with Titan artifacts—design specs, software documentation and memorabilia going back to the beginning of the project in the late 1970s. The remaining space is filled by her small desk and computer terminal, a teapot, herbal tea boxes, a menagerie of small stuffed animals, and Peanuts, Andy Capp and Garfield comic strips papering most free surfaces. A colorful poster reading "Celebrate Titan" jostles for wallspace with a bright Van Gogh print and a framed photo of a lion.

"Don't leave my favorite out of the story" she jokes, gesturing toward another poster. "As you climb the ladder of success," it reads, "don't let the boys look up your dress."

A NEW CAREER

Climb she has. Born in Detroit and the daughter of a Chrysler engineer, Placido earned a bachelor's degree in math, with an emphasis in computer science, from Wayne State University in 1973. Her first job was in applica-

Placido, 32, supervised a team devoted to making the 71B the most powerful, most adaptable, most user-friendly handheld ever created.

PHOTOS BY LARRY MAY

tions support for IBM mainframes at General Motors. Wanderlust hit in 1976, bringing her to the University of Oregon to finish her master's in computer science. The northwest's endless greenery and low-key lifestyle convinced her to stay.

"After two weeks in Oregon, I knew I wasn't going back," she remembers.

After graduating in 1977, she worked for a year and a half at Oregon State University, Corvallis, on Control Data mainframe systems support. A friend told her that the HP plant in town was hiring.

That year, 1979, turned out to be a good year to be hired at HP Corvallis. The company was putting together a team to develop the 71B and HP was looking for just the type of knowledge Placido possessed.

"Management realized we needed computer science expertise to complement the strong mathematics and statistics we generally use in designing our calculators," Placido says.

From the start, the 71B effort was unique. It was being developed in the calculator division of HP, but was far bigger than any previous calculator project. That meant a far bigger design team.

"There was little precedent for a group the size of the 71B team," Placido explains. "If you have a closed box, things are simple. When you open it up to I/O and plug-ins, your whole operating system world changes. In the calculator division, we weren't used to handling large-scale software development."

While most previous calculator design had been done by one engineer or a small group, the numerous 71B designers had to be broken into three groups—software, mechanical and electrical. Placido was hired as a lowly member of the software group, but soon found herself acting as an unofficial project leader, coordinating documentation and making sure communication between members of the team was standardized and efficient.

BUILDING A BETTER MACHINE

The process started with a review of the 71B's predecessor, the HP 41. This calculator was a great success among scientists and engineers—the same sophisticated audience targeted for the 71B.

"We spent a lot of time studying the 41, learning and understanding its pluses and minuses," Placido recalls. "Our job was to try and improve on it."

Analysis of the 41 turned up some problems the 71B was designed to solve.

"The three most severe criticisms of the 41 were that it wasn't fast enough, there wasn't enough memory and it needed a more sophisticated programming language," says Placido.

Solving those problems required a basic design change.

"The first constraint was that the 41 box was too small," she continues. "We realized that to provide the features we wanted—file handling, memory and so forth—we needed a bigger display and keyboard. But the 71B had to be handheld or you defeated the whole positioning of the product."

A Basic programming language was chosen to replace the low-level programming language used in the 41 because Basic was well known and easy to use. But to program in Basic, a qwerty keyboard and larger display were needed.

To increase speed, a processor was developed that was ten times faster than the 41's. Built-in RAM was expanded from a maximum of 3.5k in the 41 to a standard 17k in the 71B, with the potential for 512k of addressable memory in the future. A whopping 64k of ROM was allocated to the operating system.

Then there was the problem of retaining what was good about the 41—the HP-IL interface for communications, the ports in front for custom ROMs and added memory, and the card reader and I/O. But the 41 has only two ports, which means you give up a ROM or memory port if HP-IL or a card reader is used. Four ports were designed into the 71B.

After deciding what was needed, Placido's group began setting up the code to make new features work in harmony. They built in typing aids on the keyboard so that full words required in Basic could be typed with a single keystroke. They added special keys for file management and display routines that made maximum use of the 71B's advanced dot-matrix display.

They changed the calculator mode from Reverse Polish Notation (RPN), used in all other HP calculators, to Calc Mode, an algebraic system more consistent with the ma-

"We spent a lot of time studying the 41. Our job was to try and improve on it."

chine's Basic programming capabilities.

"It gives you automatic typing aids and does partial expression evaluation (intermediate calculation results) as you go, to make using an algebraic system as easy as using RPN," Placido explains. The Calc Mode system, along with the math ROM, lets the user review and correct long equations and checks for typing errors. "It tries to help you," Placido says.

PACKING IN POWER

"We tried to keep the friendly calculator flavor even though we were adding a lot of power. That was hard because of size limitations."

Placido's software team was eagerly writing more and more operating system code, but found itself running over the limit.

"We needed more ROM, more memory to store what we were writing," she remembers. "But there was a limit because we physically couldn't fit it or it would make the final price too high. We had to sit down and decide what to cut. That was painful." Eventually, the operating system was pared back to 64k.

In the end, they developed a machine that could do most things the 41 could—and more. The added memory and processing speed make it possible to write and run longer programs faster. The machine's power reaches its peak in the ROM-based Math Pac.

"It's awesome. Our algorithms for mathematical operations are very precise," Placido says.

"The biggest improvement over the 41 is the documentation, the fact that we consciously chose to open this machine up from the start. That's something HP doesn't have a reputation for."

Long before release, HP decided it wanted independent input and customization capability with the 71B. The company opted to open up all the internal design specifications with source code and schematics.

"Part of the reason was Apple," says Placido. "They opened up their machines and were very successful."

Opening up the 71B was no easy matter, however. Mountains of documentation had to be organized, kept up to date and in synch—a change in code in one place had to be double-checked in a dozen other places. Engineers accustomed to working solo had to become team players.

"The big challenge for marketing is that the 71B is deceptive. It's more powerful than it looks."

"The close proximity, informal attitude and open environment here at HP helped a lot," Placido says, indicating the activity visible from her desk. It was during this time, the final year of development, that her skills as a manager led to her promotion to project manager for the software group.

The documentation effort added at least a year to the development time, according to Placido. It was not the most stimulating year.

"Documentation is difficult for engineers because it simply ain't fun," she laughs. "It goes downhill. Design's fun. Implementation's probably the best because you get to see it work. Testing is a pain because the more you test the harder it gets. Then all you've got left is documentation, which is thankless work."

The only thing that may stand in the way of immediate success, Placido thinks, is the 71B's hybrid nature.

"People look at this and say, 'Where's the calculator?' "

But while users may be looking for a simple calculator, the HP marketing staff had to be taught to look for something more.

"The big challenge for marketing," says Placido, "is that the 71B is deceptive. It's more powerful than it looks."

With Titan now a reality, Placido is winding down her efforts, taking a breather from the intensity of the past four years. She's working on custom procedures, looking at new applications and putting together a software library for users.

She's proud of the way the 71B turned out and is still amazed that she helped design a machine that has become a reality.

"I have to thank HP for the . . . well, this sounds corny, but it's the privilege of letting me work on this," she says, turning a 71B over in her hands. "I mean, here it is; and I helped put it together. And it's good. It's inexpensive, it's portable and it moves information pretty fast."

She smiles with obvious pride.

"It's our baby. It's like having a kid." ☐

Tom Hager is a free-lance science writer in Eugene, OR.

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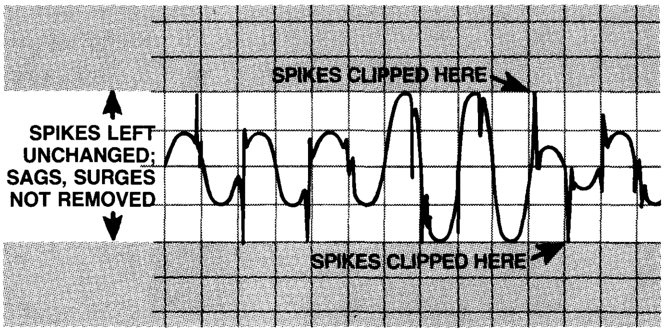
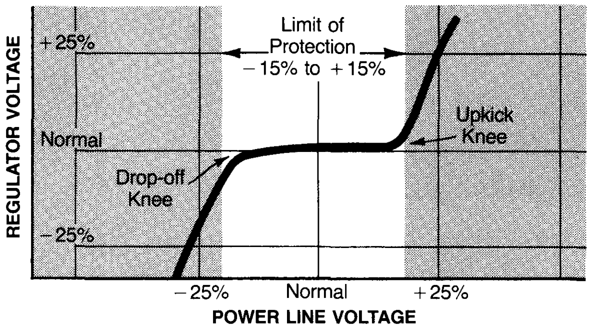
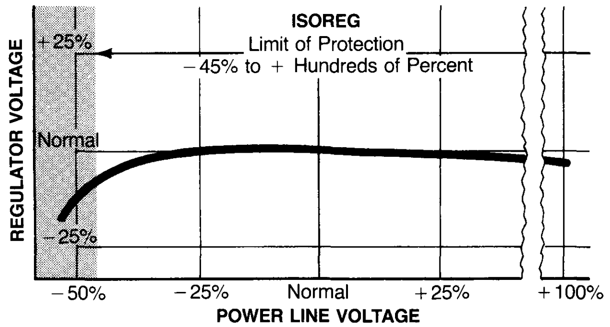
Your computer functions properly only when the electric power is clean and stable — free of spikes and glitches, of sags and surges, and brownout level voltages. Experienced computer users know this. But many are misled into buying voltage protection equipment that soon proves inadequate and not worth the alluring price. Before you decide to protect your computer from unstable, noisy power ask yourself:







What Do "Spike-Clippers" Really Clip?

Spike clippers or surge suppressors only suppress spikes exceeding "clip voltage levels" which already are much in excess of normal voltages. Spike clippers and surge suppressors do not eliminate electrical noise and surges below the "clip level" and do nothing whatever to get rid of sags, glitches and brownouts. Just think about that!

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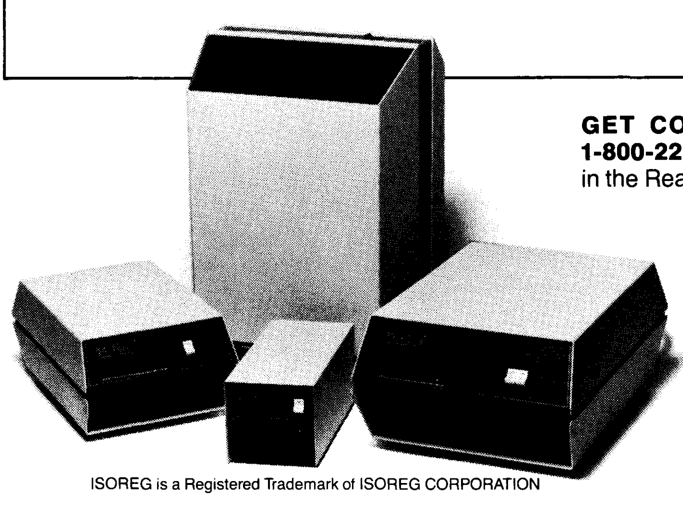
Why Expose Your Computer to Brownout Voltages and Spikes and Surges?

It makes no sense when you can have full protection. ISOREG offers line voltage conditioners from 125VA to 50kVA, single phase, and from 7½kVA to 150kVA, 3-phase.



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Circle #155 on reader service card

I read with great interest your article, "Serpents in the Circuits," by Harold Joseph Highland (*Professional Computing,* June/July) and I'm sure it proved valuable to your readers. Although I realize that the article was intentionally broad-based and, therefore, many specific issues could not be described at length, I'd like to elaborate on the author's discussion of spike suppressors/surge clippers.

Dr. Highland says that spike clipping devices should be considered only as a minimum type protection for computers. The protection offered by such devices is minimal indeed and I wonder whether such protection is worth the investment. Admittedly the cost of these devices is modest compared with more comprehensive protection such as an isolator/regulator or a UPS.

We feel spike clippers focus on the type of power disturbance that occurs less frequently than one is led to believe. A recent Bell laboratory study ("The Quality of U.S. Commercial AC Power," by M. Goldstein and P.D. Speranza, IEEE, April 1982) found that voltage sags accounted for an astounding 87 percent of all power disturbances and that sags occur even more frequently than spikes during electrical storms. Bell further found that voltage spikes accounted for only 7.5 percent of the disturbances monitored and voltage surges for eight percent.

With voltage sags the main culprit, one must question the value of devices that offer protection only from spikes—and only some spikes, not all. Spike clippers operate by shunting to ground those temporary voltage excursions that exceed a certain threshold level—"clamping voltage." Any spike less than the clamping voltage is neither eliminated nor reduced by a spike clipper.

How high is this clamping voltage? Generally 20 percent to 50 percent above the powerline peak voltage; that is, 203 to 253 volts. With lesser-magnitude spikes passing right through to the computer, one must question the value of such limited protection.

Moreover, the situation is even worse than suggested by the above numbers. Voltage spikes often are of a polarity opposite to that of the power at the moment the spike occurs. Should an opposite-polarity spike appear right when the power voltage peaks at 169 volts, the spike may not be clipped at all unless it reaches a voltage equal to the peak voltage plus the clamping voltage—that is, 372 volts to 422 volts.

So, spike clippers, or surge protectors as some people call them, protect only against the absolutely worst spikes but leave the computer unguarded against lots of less-than-giant spikes, against voltage sags, multicycle surges, brown-outs and blackouts. Can it be that spike clippers provide an illusion of protection?

Is it not wiser to spend a little more and get the substance of protection—the kind you get from an isolator/regulator or a UPS? I, for my part, think so.

Emil B. Rechsteiner
President
Isoreg Corp., Littleton, MA

Harold Highland replies: *I had an advance copy of the Goldstein and Speranza study of the quality of commercial AC power, and voltage sags definitely occur much more often than voltage spikes. There is danger from both. Most sags will reduce the speed of processing and communications and, unfortunately, some also result in faulty data transmission between the CPU, terminal, disks and printer. A voltage spike is more dangerous to the system in that it can burn out the power supply or destroy a disk and/or the drive.*

An isolator/regulator or even an uninterruptable power supply is far superior to a spike clipper. Yet most microcomputer owners are very reluctant to spend "a little more," as Mr. Rechsteiner notes. Even if they were willing to spend more, most microcomputer dealers promote spike clippers but few, if any, carry isolator/regulators or UPS units. I checked with 13 dealers in the greater New York area and only one carried anything but spike clippers; many felt that anything more was not really needed. One dealer had UPS units incorporating a spike clipper, but did not condition the line.

For a typical professional user with a small system (about $5,000), the cost of purchasing:

- *a spike clipper (about $100 for a quality unit, or as little as $10) adds about two percent to the initial investment;*
- *An isolator/regulator line conditioner (about $340) is seven percent of the original cost of equipment; and*
- *a UPS (about $1,700) is 35 percent of the initial cost.*

The $340 and $1,700 prices are for minimum wattage units unable to support a hard disk and are of medium quality. In my own case, I have quality microcomputer equipment and total electrical support with a quality UPS, which also offers a spike clipper and a voltage regulator. It cost $2,500. But the investment in protective electrical equipment amounts to 42 percent of my microcomputer equipment cost—almost 30 percent of the total cost.

●

I read your excellent article on the three-program set *Forms/80* from the Users Library ("Order Out Of Chaos," June/July). I am eager to try your program *Notepad* as described in the article.

From the documentation I received from HP, I would not have realized the power of this program. You can do a great service to the users and programmers of the HP 86 if you would continue to write articles on the binaries available.

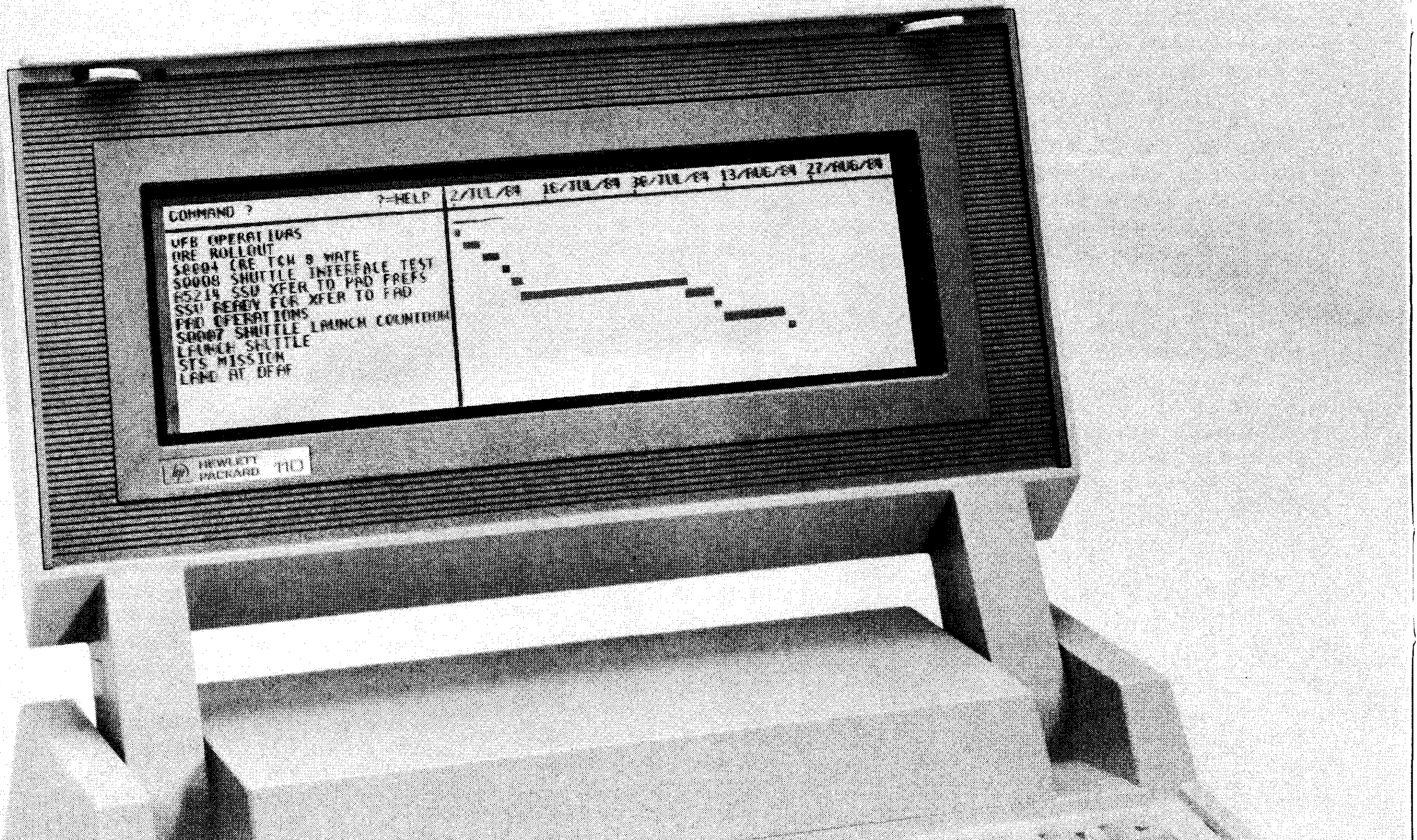
Please send a copy of the program *Notepad.* I will be using binary Stevie from the *File/80* file manager. I have acquired the *Forms/80* from the Users Library. Hopefully, *Notepad* will be part of my library.

Constance J. Byrnes
Council Bluffs, IA

Your wish is our command. On page 42 of this issue, we explore the free binaries available for the 86/87. And hopefully, your copy of Notepad *will have become part of your library by the time you read this.*

Address questions about our content or HP equipment to: Editor, Professional Computing, *605 Third Ave., New York, NY 10158. Please include your name and address. For a direct reply, enclose a self-addressed, stamped envelope. Letters may be edited for clarity and brevity.* ☐

Westminster Software introduces The PERTable.™



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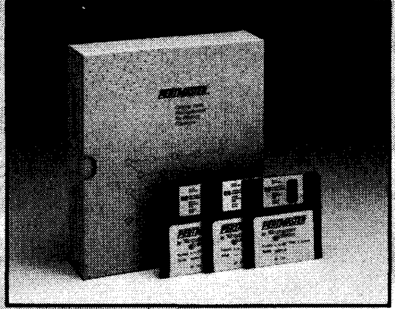

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Circle #156 on reader service card

Q: I have an HP 87 with an 82901M dual disk drive, an 82905B printer, an 82936A ROM drawer, a 00087-15003 I/O ROM, a 00087-15002 plotter ROM and a 085 modem option.

We purchased this equipment, along with a structural engineering software package, as a design tool, and both have done a good job. We would now like to purchase a word processing program and a letter-quality printer as a report and specification writing aid. What sort of software and equipment would you suggest?

In order of preference, our concerns are: low cost, ease of operation and an internal dictionary.

Robert S. Pitts, P.E.
Pitts & Associates Engineers, P.A.
Little Rock, AR

A: *Let's deal with the printer situation first. If you want to use a non-HP printer, you'll need an IEEE-488 (HP-IB) interface converter. A typical unit is model 488PA from Black Box (Box 12800, Pittsburgh, PA 15241), priced at $256. This will adapt your computer bus to the Centronics standard used by many popular letter-quality printers. Black Box also offers serial converters. You then would be free to use any popular printer, new or used.*

There is a good selection of word processing software from which you can choose. We'll only be mentioning so-called native programs since you don't indicate your having a CP/M module. We also assume you have at least 128k of RAM in your system, but we'll include the memory requirements of each program.

- Pagefile, *$75, from Milton Beychok, 63 Oak Tree Lane, Irvine, CA 92715. It requires 30k RAM and AP ROM set.*

This is a simple typewriter emulator, page oriented. What you see is what you get—no formatting and requires user customization.

- Paperiter, *$99, from Threshold Software, 1832 Tribute Rd., Suite E, Sacramento, CA 95815. It requires 64k RAM.*

This is an adaptive, multimode processor with sorting, some formatting features, block moves and other standard features. It accepts embedded commands.

- Word/80B, *$250, from HP local sales offices. It requires 128k RAM.*

A more elaborate word processor, this program runs under separate Editor and Format modes. It's best suited to larger documents because of the separation of its functions in two different programs.

- Word Whiz, *$119, from A Gentle Wind Inc., Box 3103, Albany, NY 12203. It requires 96k RAM.*

This is a combination word processor/file recovery program with a fast memo writer and file linking. What you see is what you get and it includes most standard word processing functions, but with limited formatting features.

- Write/86, *$350, from Applied Research & Consulting, 2938 Madison Ave., Loveland, CO 80537. It requires 96k RAM.*

A file-oriented word processor with many advanced features, this program has embedded commands, a full word processor command set and unique UN-DO *operator features. It does boilerplate, search-and-replace, and auto-page numbering. File program Access is an option.*

- Write/Idea87, *$69, also from Threshold Software. It requires 64k RAM.*

Originally written for the 85, this upgrade has many standard word processing features implemented in nonstandard ways. It supports boilerplating and formatting, but the screen image does not reflect the look of the finished product. It has a unique plotter file transfer program.

None of these programs support a dictionary spelling-checker feature and ease of operation is most affected by the intended use. If you want to produce manuals or large documents, you probably want one of the more expensive products.

For producing letters and short reports where elaborate formatting is not required, one of the less expensive packages should prove adequate. We'll be having more detailed information on Series 80 word processors in future issues.

Q: I have graduated from an HP 85 to an 87XM and have found it, in general, simple to transfer programs via tape and disk from the 85 to the 87XM.

I have, however, had trouble transferring the 85 Standard Pac game *Ski*. The program listing before and after transfer is identical in every detail, but while the setup and display, etc., run correctly, the function keys designated for user movement have no effect. In the first few seconds, the skier is always moving off the screen to the right.

However, the program statements for movement control from the keys appear to be correct. How can I correct the problem?

G.F.J. Garlick
Los Angeles, CA

A: *Your problem is quite common to people who infrequently have to convert 83/85 programs to the 86/7.*

There are only eight soft keys on the 85, but there are 14 on the 86/7. Since the game uses the graphics screen, the system can't manage the label placement automatically. The screen legends you see are assigned as ordinary graphics Label statements. The problem is that the instruction labels are being written in the wrong place. The keys do work normally.

Here are the lines that need to be changed to make the labels line up better. Note that they won't line up perfectly as the program uses default Graph mode, not Graphall.

```
570 MOVE 0,10 @ LABEL "8-REPEAT"
580 MOVE 0,0 @ LABEL "2-START 3-LEFT
    4-RIGHT"
700 PEN -V9 @ MOVE 0,0 @ LABEL
    "2-START" @ BEEP 15,10
710 PEN V9 @ MOVE 0,0 @ LABEL
    "2-START" @ BEEP 25,20
1360 PEN -V9 @ MOVE 0,0 @ LABEL
    "2-START" @ BEEP 15,10
1370 PEN -V9 @ MOVE 0,10 @ LABEL
    "8-REPEAT" @ BEEP 40,15
1380 PEN V9 @ MOVE 0,0 @ LABEL
    "2-START" @ BEEP 25,20
1390 PEN V9 @ MOVE 0,10 @ LABEL
    "8-REPEAT" @ BEEP 12,25
```

Another possible solution is to reassign the soft key branching statements to use keys that line up better with the existing graphics.

Q: I recently installed three HP 150 computers equipped with the 9133XV Winchester hard disk and one disk drive. In the first week of operation,

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Circle #157 on reader service card

two of my users formatted the hard disk that was configured to be drive A. This wiped out all the application programs. They had intended to format a data disk on drive B. It seems that the formatter defaults to drive A and novice users are wont to start formatting without realizing what they are doing.

HP recommends putting the hard disk on drive A, which is fine because it is efficient. However, there doesn't seem to be a remedy for this situation. It would be nice if the hard disk had a format switch like a 7906 drive, but it doesn't. Or it would be nice if there was a software switch in the formatter, but there isn't. Or it would be nice if the default could be changed to drive B, but it can't.

Does anybody have a solution for this problem?

John T. Mulhall
Chevrolet Engineering
Warren, MI

A: *This is becoming quite common as the number of hard disk users increases. We've spoken to engineers at HPCoach as well as local software engineering people. There is no way to lock out initialization of the 9133XV model, but you can help to minimize the possibility by not storing the operating system on it. Instead, HP is now recommending that you keep the OS only on the 3.5-inch flexible disk that it is supplied on, or a backup copy of same.*

The difficulty is that PAM identifies the source drive from which it loads MS-DOS as the A drive, no matter what. If you don't keep the operating system on the Winchester, it won't be identified as the A drive. HP is currently looking into whether suitable modifications can be made in PAM or the CONFIG.EXE file so that this problem can be sidestepped in later releases.

While this makes for a slightly slower startup each time you cold-boot, it is much safer, particularly when inexperienced users want to let their fingers do the walking—or touching in this case.

Q: For months now, I have been looking for a printer buffer that has IEEE-488 interfaces in and out. Do you know of any? I don't want to spend the money for HP's parallel interface module. Is there any other way for me to have a printer buffer between the HP 87 and my Epson printer?

Milton Beychok
Irvine, CA

A: *The issue of printer compatibility is one that is receiving serious attention here and you'll be hearing more about this in issues to come.*

On the questions of IEEE-488 print buffers, there is some good news. The Eventide GPIBuff (page 57) is a unit that functions not only as an HP-IB printer buffer, but can be used as a cache memory for machines that need temporary additional memory, as during instrumentation acquisition runs. We hope to have a review of this interesting new product in the next few months.

Q: I have an HP 150 using *MemoMaker* hooked up to a Comrex CR-II printer. Everything works fine except the underline and bold enhance functions. Apparently, the control codes of the printer are not the same as those output by *MemoMaker* and all I get is garbage.

Is there any way I can change the control codes output by *MemoMaker* to match the printer codes?

Richard Barthelemy
Bart Enterprises
Napa, CA

A: *Since* MemoMaker *checks the computer's configuration setup for the type of printer, it can only print directly to HP-supported printers. However, it is possible to send* MemoMaker *files to virtually any printer, complete with all print enhancements, by using a separate print program.*

MemoMaker *files are stored as standard text files with embedded control characters to indicate the beginning and end of bold and underline enhancements. A simple Basic program can read the* MemoMaker *file and send it to the printer, replacing the necessary printer control sequences when the embedded formatting codes are encountered.* MemoMaker *uses a CTRL-B (ASCII value 2) to indicate the beginning or end of bold enhancement and a CTRL-S (ASCII value 19) to indicate the beginning or end of underline enhancement. The program on page 78 looks for these control characters and substitutes the appropriate printer commands.*

This program is designed to drive a ThinkJet printer, but can be modified for any printer that has built-in bold and underline capabilities. Additionally, the program can be extended to check for other special characters to access other print enhancements such as expanded characters or superscripts and subscripts.

A post-formatting program can add other features not included in MemoMaker. *For example, the program provides the option to include page numbers. Refer to the comments in the program and use your creativity to add additional features.* ☐

Rumors rampant about HP product additions

Now that HP has joined the mass market big leagues, the company finds itself under the microscopic examination of industry pundits trying to get a handle on new products and upgrades.

According to several late-summer news reports, HP will introduce a high-powered desktop computer on Nov. 1. The product is expected to retail for $4,000-5,000.

Not entirely true. HP has no plans to introduce any new equipment until after the first of the year. HP spokesman Steve Ruddock insists he can neither "confirm nor deny anything about unannounced future products."

But even if HP won't talk officially about upcoming products, it has hinted. HP spokespeople have long said that if observers took a close look at what was missing from the present product line, they'd be able to guess what new additions were coming.

And what's missing? A transportable—sometimes called a luggable. HP's going after market share, and that requires a complete line: a desktop (like the Touchscreen), a portable (like The Portable), quality printers (like the ThinkJet and LaserJet) and a transportable.

Also on the rumor front is word that HP will bring to market an upgraded Portable with a larger LCD screen and slots for plug-in ROM cartridges.

Again, Ruddock will neither confirm nor deny. He did say, however, that "HP takes a relatively conservative viewpoint in terms of larger LCDs coming in the near future. Our R&D department says they don't expect to see larger LCDs that meet HP's quality and quantity standards until 1985, certainly not in 1984. We don't expect to obsolete our own product anytime soon," he added.

So what's HP up to? Only time will tell, but certain assumptions can be made.

The Portable has been criticized for its relatively high price and hard-to-read LCD screen, and it's expected that a company of HP's caliber would endeavor to improve on these deficiencies.

With improvements in portable screen technology coming every day, it's only a matter of time before all portable computers have optimum screens. As for price points, that's anyone's guess.

Will they or won't they? Only HP knows for sure and HP's not talking, at least not specifically or officially. Stay tuned for complete details on all these developments.

HP advertising runs full-throttle

HP placed third in advertising space among computer manufacturers that advertised in the *Wall Street Journal* during the first half of this year, according to a report by Communications Trends Inc.

Based on the eastern edition of the *Wall Street Journal,* HP ads filled 2,979 column inches, compared to IBM's 4,881 and Apple's 3,025 column inches.

In other advertising-related news, HP reports that its introductory ad campaign for The Portable, which began in May, cost the company $10 million through September.

The first three months of the campaign involved newspapers in major markets. In August, HP began running ads for The Portable and the Touchscreen Personal Computer on television and in major magazines.

Although the company is looking into radio advertising for The Portable, it probably won't use it for the Touchscreen since the novelty of the touchscreen is conveyed better visually.

HP targets marketing

The much-publicized July appointment of HP's Dean O. Morton to the newly-created position of chief operating officer heralded a major reorganization plan aimed at improving marketing operations of HP.

The appointment of two new executive vice presidents and four new vice presidents also was announced as the company reorganized into five divisions: Measurement, Design and Manufacturing Systems; Analytical Components, Medical and Technology; Marketing and International; Information Systems and Networks; and Finance and Administration.

According to CEO John Young, the reorganization, "puts HP in a better position to provide our growing customer base, and, especially our major accounts, with fully integrated product solutions drawn from anywhere in the country."

He added that the changes "signify a further commitment to being the best business partner we can be for our customers, while preserving the HP traditions of technical excellence and product quality."

The reorganization reflects HP's growing awareness of the need for more emphasis on marketing if the technology-driven company is to survive in the highly competitive consumer pc arena.

Since the introduction of the HP 150 last fall, HP has grabbed a 6.1 percent share of the $6 billion office computer market and has moved into third place behind IBM and Apple, according to market researcher InfoCorp.

HP has undergone only one previous change in top management since its founding in 1939. That was in 1978 when Young became president.

In keeping with its policy of promoting from within, both newly-appointed executive VPs and three of the new VPs are veterans of HP. Only Joel S. Birnbaum, newly-appointed vice president and director of HP Laboratories, has less than 20 years experience, having joined HP in 1980.

John L. Doyle and Richard C. Alberding were promoted to executive vice presidents. Doyle heads Information Systems and Networks and Alberding is in charge of the Marketing and International sector.

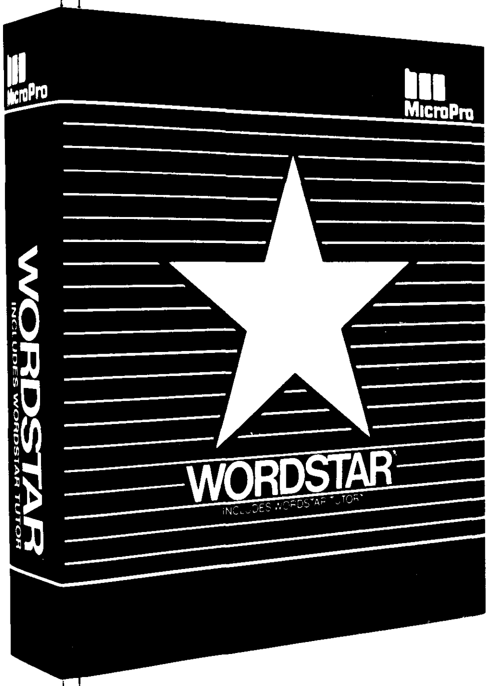
Promoted to vice president along with Birnbaum were William G. Parzybok Jr., VP and general manager of the Design Systems Group; Cyril J. Yansouni, VP and GM of the Personal Computer Group; and Alan D. Bickell, VP and director of Intercontinental operations. Finance and Administration remains essentially unchanged.

WordStar upgrade

For those of you who might have missed it, it's not too late to upgrade your 3.3 and 3.3A versions of *HPTouch WordStar* to 3.3B.

Though the initial deadline has passed, old *WordStar* master disks are being accepted and exchanged for the upgraded version until Oct. 31.

The *WordStar* upgrade, available from HP at no charge, has been improved in several areas and several bugs have been corrected.



Most significant are increases in printer speeds and screen response time and the elimination of erratic cursor movement.

Depending on your printer, *WordStar* 3.3B improves its output speed by 10 to 40 percent over version 3.3A. Gone is the jitter, the overshoot and the strange anomaly that sent the cursor off on a haphazard journey across the screen before coming to rest at a random location.

"In previous versions we went through AIOS, the screen input/output preprocessor," noted Kathy Weiler *HPTouch WordStar* product manager. "There was so much overhead there that it caused a certain amount of cursor uncertainty. In the new version, we bypassed AIOS and ran it directly to the screen hardware."

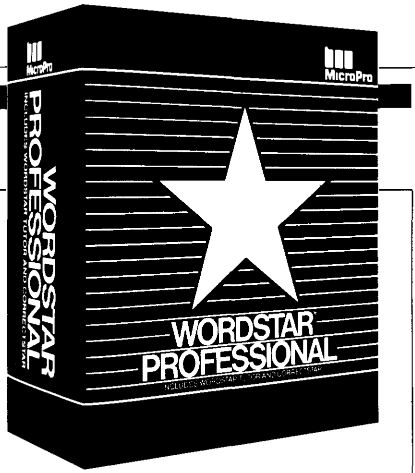
As a result, the screen is updated much more quickly. Typing and text entry are more responsive. The speed on the numeric keypad is vastly improved, as are horizontal and vertical scrolling.

One of the bugs corrected in the new *WordStar* version is the one in the spelling checker, *SpellStar*, which hangs up the system and requires a hard reset when cursor movement keys are used.

The new version adds support for the Touchscreen internal printer that uses perforated paper.

A 3.3C version that runs on the HP 150, the new Touchscreen and The Portable, will begin shipment at the end of October.

There are no significant enhancements over the 3.3B version.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More to come for the Touchscreen

CorrectStar, MicroPro's upgraded spelling dictionary, is expected to be available for the Touchscreen Personal Computer by year's end.

The HPTouch version of *CorrectStar* had to await the arrival of the new Touchscreen and the 9122 double-sided disk drives. *CorrectStar's* files are too long for single-sided disk drives sold with the HP 150. The original 150 can be upgraded to accommodate a double-sided disk drive (see cover story).

CorrectStar incorporates a dictionary of more than 50,000 words, 30,000 more than its predecessor, *SpellStar*. It also provides a list of spelling alternatives. *SpellStar* offers no alternatives.

StarIndex, which enables the user to create automatically an index to a manuscript, also will be available. Each entry to be indexed is flagged by the user, and the program builds the index alphabetically using the words flagged and the page numbers on which they appear.

StarIndex also creates tables of contents, assembles lists of figures and tables, permits enhanced printing within the index, inserts blank pages where necessary to begin chapters on a right-hand page, and permits numbering of pages by chapter.

HP plans to offer the *WordStar Professional Package*, which includes *WordStar, MailMerge, StarIndex* and a spell checker (either *SpellStar* or *CorrectStar*), for $700.

A *Professional Option Package*, which will sell for $350, offers *CorrectStar* or *SpellStar* and *MailMerge* and *StarIndex*.

CorrectStar and a new version of *WordStar* will be offered for The Portable as well. The Portable does not support *SpellStar* because of its small screen.

HPCoach, 1-2-3, on board via CompuServe

For those who didn't know, HPCoach now offers a bulletin board service (BBS) through CompuServe.

Users can leave questions on the BBS 24 hours a day and have an answer from HP, usually within four hours during the work day.

The BBS is not limited to chats with Coach, however. The space can be used as a forum for exchanging information, sending messages, etc.

In addition to offering a 24-hour forum, CompuServe provides access to Coach on an international basis. HPCoach (800)472-6224, the toll-free telephone hotline, is primarily a national service.

The HPCoach BBS is a segment of the INTEREX bulletin board.

Users of the Touchscreen and The Portable who frequently use Lotus 1-2-3 and who will eventually access Symphony, now have a users forum designed to answer their questions, also via CompuServe.

Users in the metropolitan areas can access the service through one of more than 400 local numbers at no additional cost. Access in rural areas can be obtained through Telenet or TymNet, both of which carry a surcharge.

Check your phone book, ask your local dealer or call CompuServe's toll-free customer service number, (800) 848-8199.

Low cost of ownership for Series 200

Results of a two-year study by HP of meantime-between-failures (MTBF) data show that owners of the Series 200 machines spend less than three percent of the cost of their systems on repairs during an average year. Other manufacturers reported figures as high as 15 percent.

The figures, based on warranty failure rates and repair costs, are reflected in monthly maintenance charges published by HP and most other computer manufactuers.

The Industry

AT&T MAKES SHIFT TO MICROS

July was a busy month for AT&T. With the introduction of the PC6300, the communications giant got its feet wet in an already crowded industry. The PC6300 runs on MS-DOS, rather than Unix, the operating system AT&T is trying to make the industry standard. Olivetti will market Unix throughout Europe.

Also in July, AT&T announced the opening of a new Tokyo office to market Unix in the Far East.

What do these new marketing strategies mean? According to Leonard Hyman, a vice president at Merril-Lynch, "AT&T obviously wanted to get into the market very quickly. By using an MS-DOS system, it allowed itself to concentrate on areas it knows best—high-powered systems like the 3B which allow for maximum performance in an integrated work station.

Olivetti fits into the puzzle by creating a mutually beneficial avenue by which the two companies may draw on each other's expertise and already established markets to sell their products.

As for Tokyo, this move is just another part of the big picture. Says Hyman, "AT&T is simply trying to get back into an international market it left years ago and literally gave up to the competition."

FEDERAL $ FOR SCHOOL MICROS

Computer literacy should not be available only to students whose school systems can afford to purchase computers for every classroom. So state two bills currently under consideration by the House Subcommittee on Science, Research and Technology. Authored by the National Education Association (NEA), the bills earmark $345 million to provide hardware and software to schools.

The Computer Literacy Act would appropriate $300 million over 10 years for the purchase of microcomputers by schools. The National Education Corporation bill would deliver $45 million in federal funds to encourage software manufacturers to develop high-quality educational packages. A House vote on the bill was expected by mid-September.

Passage of either bill would speed much-needed money to schools and software houses, presumably to help build a base of young computer literates.

WHAT WILL JACK DO NEXT?

Industry observers are anxiously awaiting the first competitive actions of Jack Tramiel, former head of Commodore, who purchased Atari from Warner Communications last July. Commodore's success was considered largely responsible for Atari's poor sales over the last few years.

Experts predict that Tramiel is just what the ailing Atari needs to regain ground the company lost in head-to-head battles with other mid-range home computer and dedicated video game manufacturers. Tramiel believes he can turn Atari around and hopes to have a new product line ready for this Christmas season.

Forecasters are looking for Atari to offer new low-end machines in the $100-$300 range, and a more sophisticated computer for approximately $1,000. Atari has already announced new 8-bit and 32-bit machines.

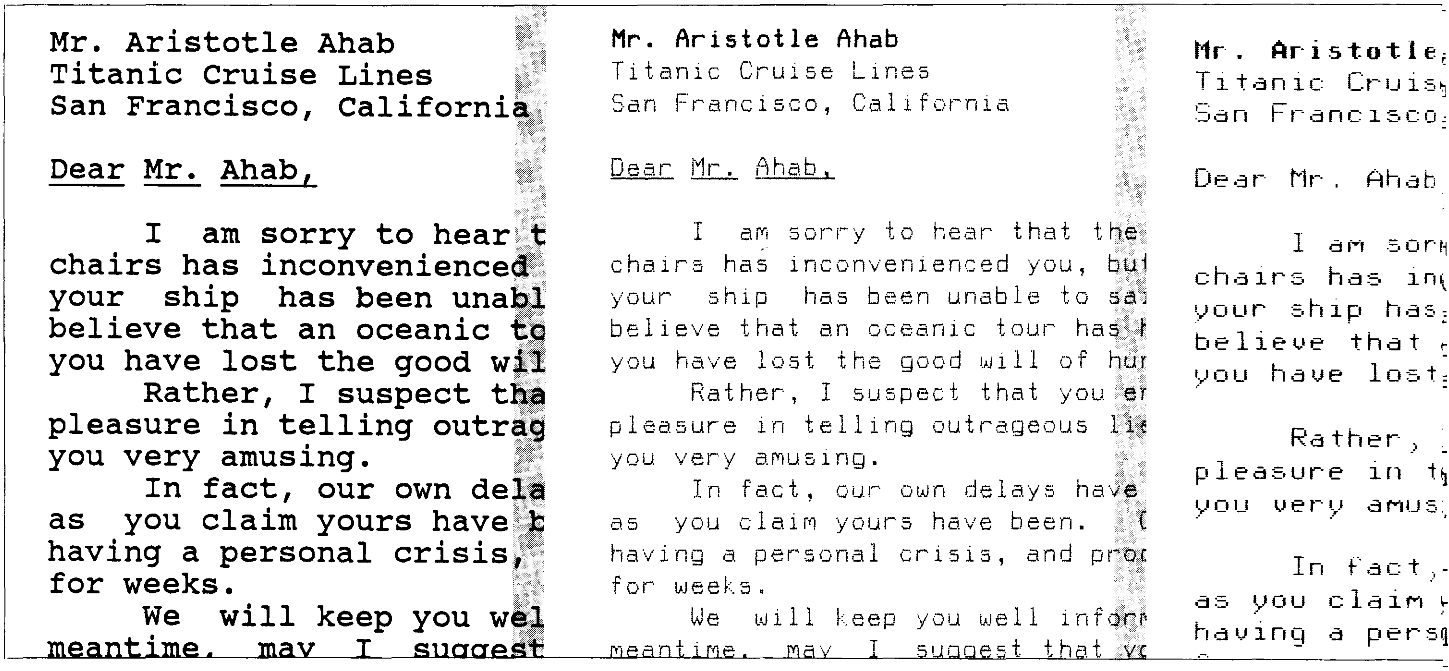
If Tramiel is successful in his venture to bridge the gap between Commodore and Apple, the two major pc manufacturers could be in for some damaging, if not lethal, competition.

NEW TOUCHSCREEN PC

Santa Barbara Development Laboratories (SBDL) has introduced the Centerpoint 1000, a new touchscreen computer system aimed at the high-level business executive.

Centerpoint's standard configuration consists of an "executive console" with a touchscreen computer, and a dual-screen secretarial console with a color touchscreen monitor and a monochrome monitor for word processing. Both consoles feature an integrated telephone/speakerphone. The entire system is $30,000.

According to Reg Parker, vice president of marketing and sales, SBDL does not expect to cut into the existing pc market with this machine. Instead, he points out the company is hoping to work with larger OEMs that might find Centerpoint a useful addition to product lines. SBDL will also market the Centerpoint through its small direct sales force. ☐



Mr. Aristotle Ahab
Titanic Cruise Lines
San Francisco, California

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Performance, interface, price: HP's LaserJet, ThinkJet, internal thermal, dot matrix impact and daisywheel printers.

HARDCOPY:

BY ANDY SANTONI

HP offers about as wide a range of printers as any peripherals supplier. So if you're shopping for a printer, it's likely there is one for your specific application. The problem is deciding which one represents the best combination of price, performance and features to meet your specific needs—whether you're using your HP computer in the office, the laboratory or at home.

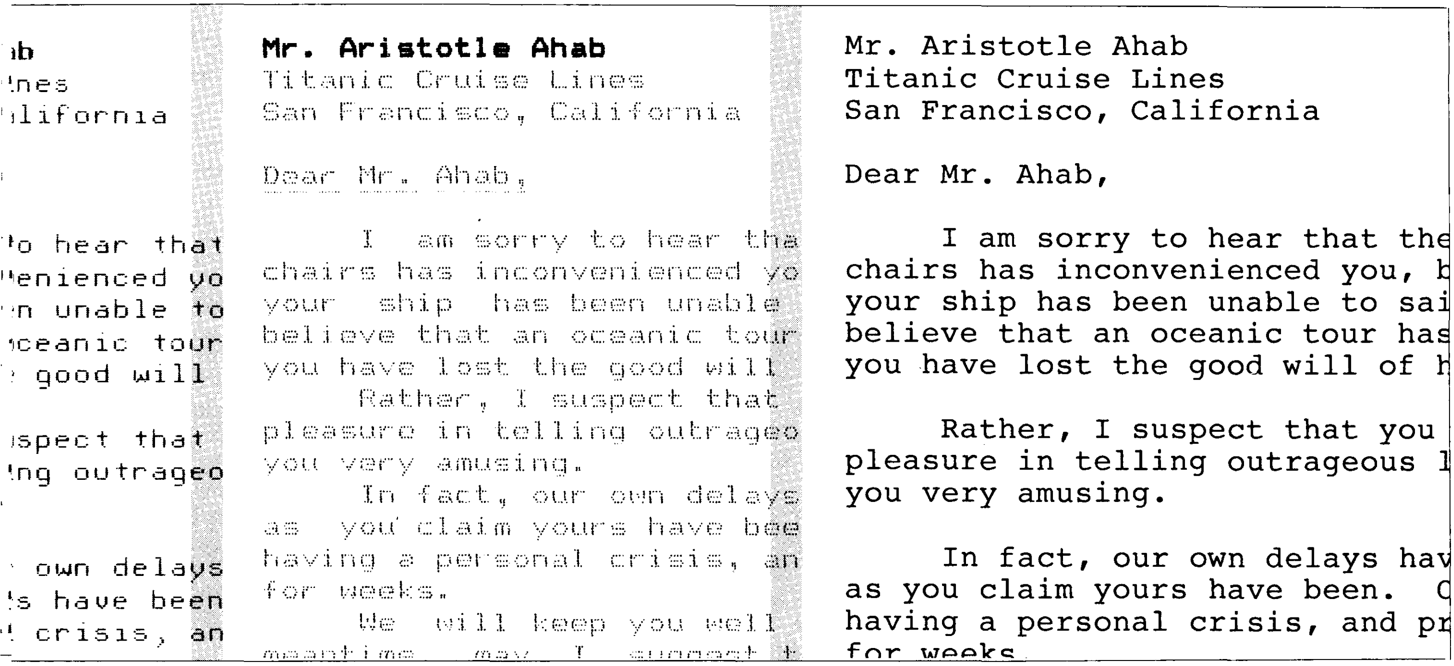
HP printers range from the inexpensive ThinkJet to the fast, letter-quality LaserJet. In between the Jets, there are Epson dot matrix and Diablo daisywheel units and a thermal printer that fits into the top of HP's Touchscreen Personal Computer. Each offers features that are appropriate for some applications, and less appropriate for others.

Whichever printer you choose, you will find interfacing an HP printer to an HP computer is pretty simple. One good reason for selecting an HP printer for your HP computer is that concise and complete directions for interfacing each printer to different HP computers is included in each printer's manual.

Not every computer is covered in each manual, however. HP gives detailed interfacing information only for the computers the company thinks are most appropriate for each printer model. In some cases, a manual doesn't include computers introduced after the printer was introduced; the ThinkJet manual doesn't mention The Portable (HP 110), for example, even though this will be a common combination. There may be updates available for some manuals, however, and HP will provide detailed information through its HPCoach toll-free number (800-472-6224), dealers or local offices.

HP will have to provide you with information on compatibility of a printer with the software you're using too. There are too many software packages in use today to give specific information here, so you'll have to check for yourself. Some HP printers have features you'll want to use but can't because your word processing software doesn't have the capability to use them. But HP is working with software vendors to make sure software works with the LaserJet printer, for example, and to make whatever changes are necessary on software now available.

For some users, help from HP's local offices is the best reason for selecting an HP printer. Consider that the Epson and Diablo printers from HP also are available under their own labels from hundreds of dealers for less than HP charges. You'll have to decide if, having chosen one of these models, you're willing to shell out extra money for the convenience of one-stop shopping and one-stop service.



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PRINTERS

In a large installation, or in a single-user system, saving money is probably the best course. But if you have only half a dozen computers in your office, and can't afford to have spare printers around in case of failure, you may find the convenience of HP service worth the extra cost. Think of it as an insurance policy.

LASERJET

If price is not your major concern, but high print quality is, the LaserJet (Model 2686A) is what you're looking for. At $3,495 it is far from inexpensive, but its print quality is excellent.

The first laser printers were big, fast and expensive—close to half a million dollars a unit. Prices had been coming down but, until recently, laser technology was still too expensive for individual users or owners of small clusters of personal computers. The LaserJet, while not cheap, is at least within reach of many computer users.

Inside the LaserJet is a light-sensitive cylinder that can hold an electrical charge on its surface. As the cylinder rotates, a strong positive charge is placed on that surface. A laser beam scans the surface, turning on and off at high speed. Wherever the beam hits, the drum is discharged, creating a zero charge that corresponds to a dot.

Finally, toner is brushed onto the drum surface. The toner, a fine black powder, has a positive charge and won't stick permanently to anything else with a positive charge—like the drum. The toner will lie temporarily on the dots formed by the laser.

The images on the drum are transferred to a piece of paper that has been negatively charged, and are fused onto the paper by a 200°C roller.

The process is similar to that of a xerographic copier, except that the image is placed on the drum by a laser instead of by reflected light. The result is sharper than a photocopy.

The LaserJet is a step beyond letter quality. It can print a letter or other copy with the quality of the best typewriter, if that's what you need. But you can also select an alternate type style by simply plugging in one of the six font cartridges available ($225 each) and transmitting an escape sequence from your computer. The LaserJet also is capable of graphics, boldface, underline and proportional spacing, among other enhancements. The number of fonts will probably double by year's end.

The LaserJet's $99 disposable toner cartridge might sound expensive, too, but it really isn't. Consider that an impact printer's $10 ribbon might be good for 300 pages at best.

One good reason for selecting an HP printer for your HP computer is the concise yet complete interface directions included with HP printers.

The LaserJet's $99 cartridge has an average life of 3,000 pages, so it costs just about the same few cents per page. And with paper at about a penny a sheet and toner about three cents, figure the LaserJet prints a page for four cents. And you don't have to change the cartridge as often as you have to change printer ribbons.

Changing cartridges is simply a matter of lifting the hinged top of the LaserJet, snapping out the old cartridge and snapping in a new one. While you're at it, you have to do some cleaning around the cartridge to make sure toner hasn't collected in the paper-handling track, a process that results in smeared copies. But the whole task should take no more than a few minutes—a lot quicker than threading a new ribbon into some printers.

You save time while the printer's printing, too. The LaserJet is a page printer, as opposed to a character or line printer, so its speed cannot easily be compared to that of other personal computer printers. A characters-per-second (cps) specification doesn't make much sense with page printers. But at eight pages per minute, the LaserJet is as much as 10 times faster than a daisywheel printer of similar print quality.

About the only thing that may take time is showing friends and coworkers how fast this printer works. Like a photocopier, the LaserJet takes a few seconds to warm up before printing the first page, then spits out succeeding pages every seven seconds, almost as fast as you can take them out of the paper tray. And while the LaserJet can't handle multipart forms, it can often print multiple copies faster than an impact printer can complete a pass.

The LaserJet is quiet, too. You won't have to make special preparations to keep your printer from disturbing your telephone calls or your coworkers. The money you save by not needing special printer tables, room dividers and quieting enclosures goes a long way toward offsetting the LaserJet's price.

You can also save money with the LaserJet by using ordinary paper. You don't need tractor-feed or thermal paper. The LaserJet handles standard 8.5 by 11-inch bond, legal and European sizes, automatically from paper trays or manually one sheet at a time. The printer's standard sheet feeder saves a few dollars, too, compared with a daisywheel printer and a separate sheet feeder.

If there is a drawback to the LaserJet, it may be the printer's weight. At 71 pounds, the

Printer	**LaserJet 2686A**	**ThinkJet 2225**	**Internal 2647A**	**Impact 82906A**	**Daisywheel 2602A**
Price	$3,495	$495	$495	$995	$1,595
Paper	sheet	sheet, fanfold	roll, fanfold	sheet, fanfold, multipart	sheet, fanfold, multipart
Peak Speed	8 pp./min	150 cps	120 cps	160 cps	25 cps
Overprint character	Yes	Yes	No	Yes	Yes
Overprint line	Yes	Yes	No	Yes	Yes
Strikeout	No	Yes	Yes	Yes	Yes
Underline	Yes	Yes	Yes	Yes	Yes
Double-strike	Yes	Yes	Yes	Yes	Yes
Boldface	Yes	Yes	Yes	Yes	Yes
Subscript	Yes	Yes	No	Yes	Yes
Superscript	Yes	Yes	No	Yes	Yes
Graphics	Yes	Yes	Yes	Yes	No

INTERFACE INFORMATION

LaserJet (RS-232C)	ThinkJet (HP-IB)	ThinkJet (HP-IL)	ThinkJet (Centronics)
HP 150 IBM PC	HP 120, 125, 150, 80s, 200s	HP-41, 71, 75, 80s	HP, IBM PC, Apple, TRS

Internal (special)	Impact (HP-IB)	Daisywheel (RS-232C, HP-IB)
HP 150	80s, 100s, 200s	HP 120, 125, 80s

LaserJet can't be moved easily. But the LaserJet's RS-232C interface lets you locate the printer up to 50 feet away from a computer, so you might consider cabling a number of computers to a LaserJet through a switch box.

HP paid a lot of attention to the capability of sending print commands to the printer. For instance, there should be no trouble using the LaserJet with an HP 87, even though that computer is not specifically supported.

Another disappointment was a lack of interface options. Connection has to be via the RS-232C—setting the correct switches on the serial interface won't work unless you happen to have a Smart Cable (IQ Technologies, Bellevue, WA). A Centronics interface would be better in order to take advantage of the LaserJet's graphics capability.

Also, the LaserJet prints only in black, at least for now. HP is working on blue and brown cartridges, but multicolor printouts will require multiple passes through the printer. If you do true multicolor work, you're probably better off with a color plotter anyway.

The machine's manual is well-organized and its illustrations are clear; you won't need a service contract just for changing the toner cartridge. Included are 32 illustrated pages devoted to interpreting warnings and listings of possible problems.

There is ambiguity in the manual's description of escape and control sequences, however. Lower case "L" and numeral "1" look almost identical.

Double-sided text is also an option, thanks to the single sheet feeder port. You have to set up for pause-on-page word processor printing, but it works. Though much more time consuming than continuous single-sided output, double-sided documents are still easier on the LaserJet than on any daisywheel printer.

The LaserJet can serve anyone who produces high-quality printed communications on a regular basis. Large corporations, government offices, small professional offices and businesses operating from homes are all likely candidates. The key is volume, such as repetitive runs for billing. The LaserJet will even handle envelope printing.

THINKJET

If price is your major consideration, HP's ThinkJet, at $495, is one of the least expensive printers on the market and it outperforms most low-cost printers by a wide margin.

The ThinkJet's print quality is better than other low-cost dot matrix printers. Although HP doesn't tout the ThinkJet as a letter quality printer, you may find the ThinkJet's dot-quality sufficient for your correspondence.

The ThinkJet is also a lot quieter than a typewriter. Its muted whirr isn't loud enough to be obtrusive, like a typewriter or impact printer can be, but it lets you know the printer is working. If you have a room full of printers, you'll appreciate the ThinkJet's silence.

You'll also appreciate how easy it is to keep the ThinkJet running. Changing ink supplies and paper is a revelation after years of threading supplies into other printers. And the ink supply/printhead unit means you replace the printhead every time you need ink (about every 500 pages) so the printhead won't wear out in the middle of a large printing project, as often happens. The ink/printhead cartridge (only black is available) is $7.95; inkjet paper is $62.50 for 2,500 sheets fanfold, or $60 for 2,000 single sheets. There's also a ThinkJet printer stand available from HP for $49.

The disposable inkjet printhead includes a liquid ink supply and 12 microscopic nozzles. Each nozzle can supply a drop of ink on demand as the printhead scans across the paper.

The droplets of ink are ejected by first instantaneously vaporizing a tiny volume of ink. The vapor bubble grows rapidly, pushing the ink through a nozzle and onto the paper. The ink refills the nozzle automatically by capillary action. As the ink is used, the thimble-shaped rubber bladder collapses, providing both a constant pressure and a visual indication of the amount of ink remaining in the cartridge.

At 150 cps, the ThinkJet is fast enough to print documents while you wait. A 1k buffer helps get you back to other tasks, freeing the computer before the printer is done—you

For some users, help from HP's local offices is the best reason for selecting an HP printer.

might want to walk to the water cooler, but you won't have time for lunch. And the ThinkJet prints underline or boldface in one pass.

You might also appreciate the ThinkJet's small size and weight. Weighing less than six pounds, it can be carried in one hand. With a footprint about the size of a piece of typing paper, the ThinkJet can sit on your desk without dominating it. And it fits comfortably in a five-inch deep briefcase, with room for paper and accessories.

The ThinkJet is available with one of three interfaces: HP-IB (Interface Bus), HP-IL (HP Interface Loop) and Centronics. The HP-IL version operates from rechargeable batteries or from a supplied plug-in AC adapter and sets a record for ease of interface. Just connect a couple of wires and the printer is ready. The AC-only HP-IB and Centronics versions are more appropriate if your computer doesn't have an HP-IL interface.

The ThinkJet can print on inexpensive fanfold or single sheet paper, but better results are obtained with specially-treated paper designed for inkjet printing. Tractor feed and friction feed are built in.

You're most likely to buy a ThinkJet if you need a printer for personal use at home or if you use your computer in a small business. Large companies might want a ThinkJet for light duty and instrument makers might want to include a ThinkJet with their test systems.

INTERNAL PRINTER

If you have a Touchscreen, you might also consider the HP 2674A thermal printer, which fits into the top of the computer. This $495 option is convenient for drafts, but its use of thermal paper makes it less than ideal for general purpose usage.

The 2674A snaps into the top of the Touchscreen in a few seconds and it's easy to thread in a roll of thermal paper. The printer operates at 120 cps, fast enough for drafts of letters or graphics.

Print quality is acceptable, about on a par with the ThinkJet. But the glossy thermal paper makes copy hard to read and exposing the paper to heat—leaving a document in the trunk of your car, for example—can turn the whole sheet dark.

In sum, the 2674A offers reasonable performance and low price, along with a small footprint: it takes absolutely no space on your desk. Its niche is special applications. If you use your computer to write newsletters, for example, you might use the 2674A for rough drafts, then print out camera-ready copy on a LaserJet.

DOT MATRIX IMPACT

If you don't have the Touchscreen, you can use HP's Model 82906A dot matrix impact printer instead of the 2674A. This Epson printer, at $995, is best for low-volume, single-user applications, and offers graphics, varying widths, boldface and the ability to print on multipart forms.

The 82906A, available only with an HP-IB interface, is easy to connect and use. Changing ribbons and paper is straightforward, though not as simple as it is with the ThinkJet.

One nice feature of the 82906A is a last-form tearoff. Since the paper drive is below the printhead, you don't have to waste a blank sheet of paper at the end of each printout.

The ability to print on multipart forms is perhaps the most important feature of this printer. However, most applications for the 82906A are better served by the less-expensive ThinkJet.

DAISYWHEEL

HP's Model 2602A offers features that may be required in your application, including letter quality at a moderate price ($1,545) and the ability to print on multipart forms. The 2602A's optional HP-IB interface ($150) and its compatibility with HP word processing software, as well as other off-the-shelf personal computer software, make it an easy addition to HP systems.

The 2602A prints bidirectionally at 25 cps, with host-controlled bold, shadow and underline. Its wide carriage accommodates up to 158 columns of 12-pitch type, which is valuable when printing spreadsheets.

The 2602A might be the right choice for low-volume, single-user applications requiring letter quality print. For volumes of more than about 25 pages per day, the LaserJet may be better because of its higher print speed, fewer moving parts and higher reliability. The LaserJet can print multiple copies of a document faster than the 2602A can print a single, multipart form.

If you have to make a printer purchasing decision, there are certain criteria that you should examine. For this purpose, we have supplied a chart (see page 20) comparing all the major features of all five of these HP printers to alleviate any problems. But don't let us sway you; the only way to make a reasonable decision is to decide how the printer will actually be used and to see the unit at work. Happy shopping. ☐

Andy Santoni is a free-lance writer based in San Francisco.

BETTERCHEAPERFASTER

I have seen the future—at least the future of personal computer printing technology—and it is called the LaserJet (HP 2686A). I have never so thoroughly enjoyed using a piece of equipment.

It had to happen. The price of high-powered expensive laser printers of recent years had to drop. HP then jumped into the personal printer market with both feet. Even if HP never assumes a dominant role in personal computers, nothing has to stop it from earning a sizable share of the accessories business. With the LaserJet, HP is miles ahead on that road.

The fact that Japan's Canon Corp. has played a major role in development and production of the LaserJet is as much a tribute to HP's good judgement as it is to the marketing clout of this major electronics and optics manufacturer.

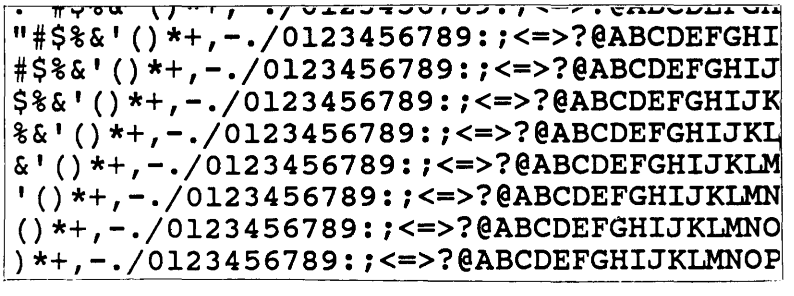
Physical impact printing methods have dominated data processing since its inception. Chain and belt/loop lineprinters, the original industry-standard hard copy peripherals, are speedily giving ground to more unconventional designs that offer improvements over the ugly, noisy paper bangers most of us recognize as printers today. Alternatives to this most raucous computer accessory are surprisingly diverse.

Foremost is laser printing. While early units were priced at several hundred thousand dollars, the appearance of the LaserJet and similar units at less than $5,000 signals the arrival of laser technology for micro users.

In principle, laser printing is a refinement of the standard electro-photographic method of plain paper copying popularized under the Xerox name.

Printed images are produced by a laser scanning a charged drum; the image is then fixed by a toner, the same technique employed by standard office copiers. A major advantage is electronic control of the font, providing the ability to change typeface with a command from the printer's controlling computer. HP's contribution to making the process affordable is its adoption of Canon's Cartridge Copier as the basis for its own product.

Another high speed, high volume printing method is inkjet printing. I get samples of this process on messy labels attached to junk mail. Its advantages are high speed and low operating cost. The HP ThinkJet is a variant on this theme.



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The main problem with inkjets are their dependence on coated or special short-grain paper to prevent smearing of the image.

Improved ink chemistry and droplet disposal can make the inkjet a very strong contender beyond the good performance of currently available devices.

Another non-impact technique is thermal printing. Sharing relatively silent operation with laser and inkjet printing, thermal printing usually fails to rise above the look of ordinary dot matrix impact units and has the disadvantage of requiring treated paper.

The laser printer is not the only charged particle copier-based printing machine. Olivetti Corp. is working on a dry electrostatic printer that uses a stream of charged carbon particles that are emitted in a microscopic stream to form images on the paper, and then fixed in place with a toner. Though it shares the mechanical aspect of binding carbon particles to the paper, little is known about how soon this is likely to result in a commercial design.

Even more unusual are the magnetic printing methods presently being explored by Cynthia Periperals Corp. of Sunnyvale CA.

Magnetic printing depends on a drum of individually addressable magnetic gaps pulsed from behind the paper. A specially doped ink adheres in a band and is fixed with toner. Though promising for raster graphics transfer, high cost is likely to keep this approach on the back burner for some time.

What's next? Though we've talked about some exotic things already, expect to see more evolutionary products based on laser and liquid crystal imaging. Ultrasonic dry carbon and tonerless print bonding techniques could be the next area for a real breakthrough. The marketing rush is on to print it betterfasterquietercheaperincolor. It doesn't take a computer projection to figure out that you are the likely winner.

Don Person

Properly executed graphics can compress pages of printout into a single, easy-to-digest chart or graph.

HARDCOPY: GRAPHICS

BY MELISSA GERBERICH

Information overload is a seemingly unavoidable by-product of the much-heralded computer revolution. While computers can process seemingly endless torrents of data, it's a fact of life that humans can absorb only so much before vision becomes blurry and the mind simply shuts down. With computers producing more than 200 billion pages of printout annually, information overload has become a pervasive malady. The cure? Graphics.

The ancient Chinese knew what they were talking about when they said, "One picture is worth a thousand words." Properly executed graphics can compress hundreds of pages of printout into a single, easy-to-digest chart or graph. Not only do they deal with data in the most basic of terms, they help define relationships among elements and analyze data.

For example, try to imagine the relationship between 19,740 and 78,960. Without a calculator, it's difficult. But look at the same relationship in graphic form (Figure 1). In one quick glance, you see the relationship—one-quarter of the whole.

Graphics isn't always the prescription for information overload, but combined with the proper dose of words and numbers, it can put you on the road to more effective communication. Knowing when and how to use graphics, however, requires at least a basic understanding of the way people think and perceive information.

Most experts agree there are two ways of thinking: verbal and nonverbal. The left hemisphere of the brain controls verbal processes. It counts, keeps track of time, draws logical conclusions and uses step-by-step reasoning. You might consider the left brain the body's internal computer.

The right brain is the nonverbal hemisphere. It's aware of objects, ideas and concepts. The right brain perceives overall patterns and is not concerned with time, reason or facts. This is the intuitive side, making decisions based on insight, hunches, feelings and visual images.

Graphics appeal primarily to the right brain, our nonverbal center, where we are able to spot trends, patterns and relationships. And even though the left brain thrives on words and numbers, certain types of graphics, such as those that incorporate precise tables or text-only charts, appeal easily here, too.

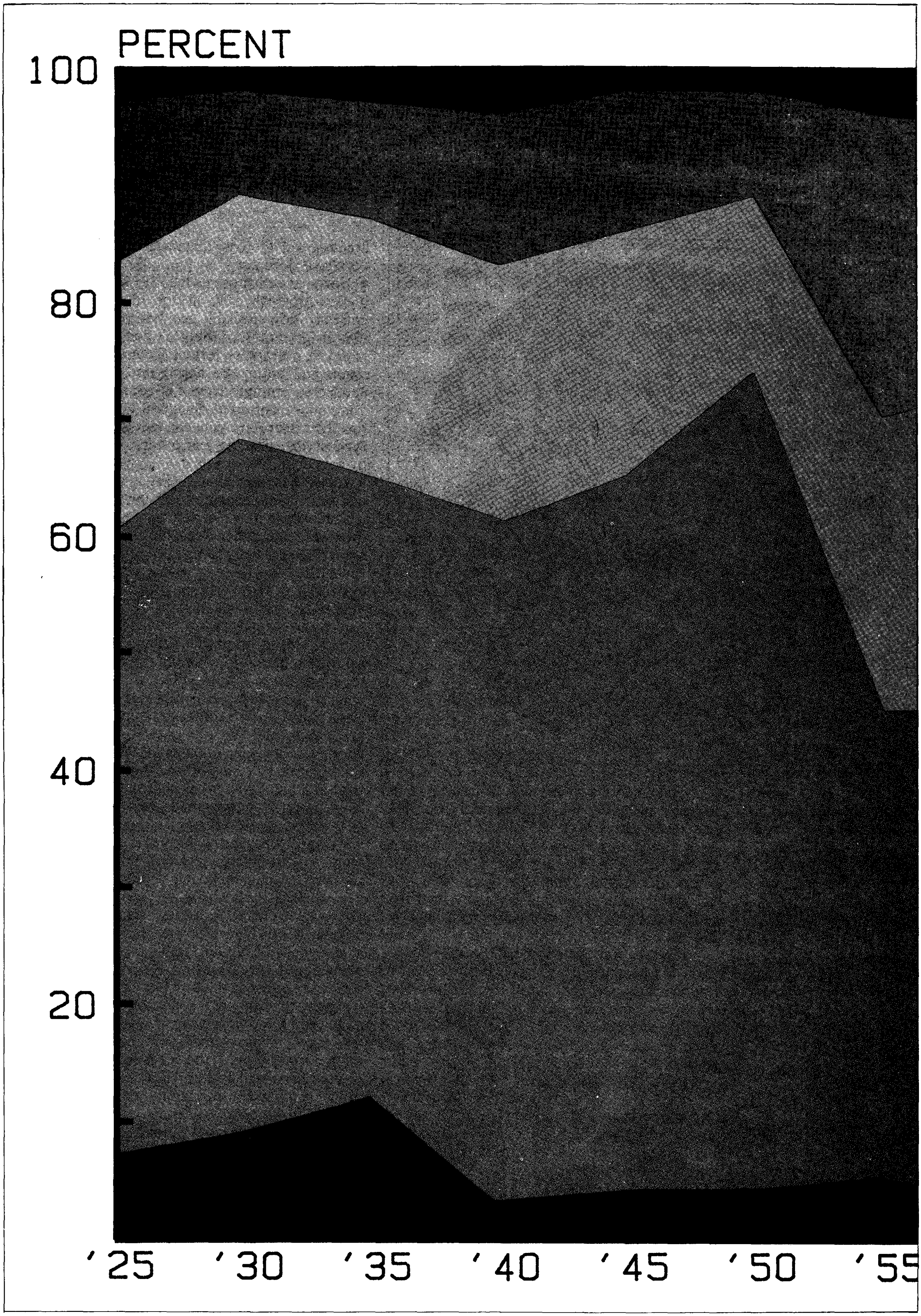
OUTPUT OPTIONS

Using the Touchscreen Personal Computer (HP 150) to produce quality graphics requires the use of graphics software such as HP's Series 100/Graphics, among others (see list, page 28). HP's package incorporates HPTouch, while others may not. If the touch capability is important to you, be sure it's there before you purchase your software.

The type of graphics that appear on the computer screen are "soft copy" graphics—turn off the computer and they're gone. Most of the time, however, you'll want to save your graphs and charts for presentations or reports. In that case, you'll need to produce "hard copy" graphics that are printed onto paper or transparencies. The two most popular vehicles for producing hard copy graphic output are printers and plotters.

Printers fall into two main categories: daisywheel printers and dot matrix printers. Daisywheel printers work just like a normal typewriter: Raised letters on the wheel strike a ribbon and force an imprint of the letter onto the paper. They produce letter-quality copy, but lack flexibility for graphics.

Much more common for graphics work is the dot matrix printer, which uses dots to form lines and characters. The quality of the graphics depends on the number of dots per inch the machine is capable of printing. Dot placement is usually determined by the mechanical limitations of the print head or paper feed.


PERCENT
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Much of the graphics software now available has been designed for non-programmers.

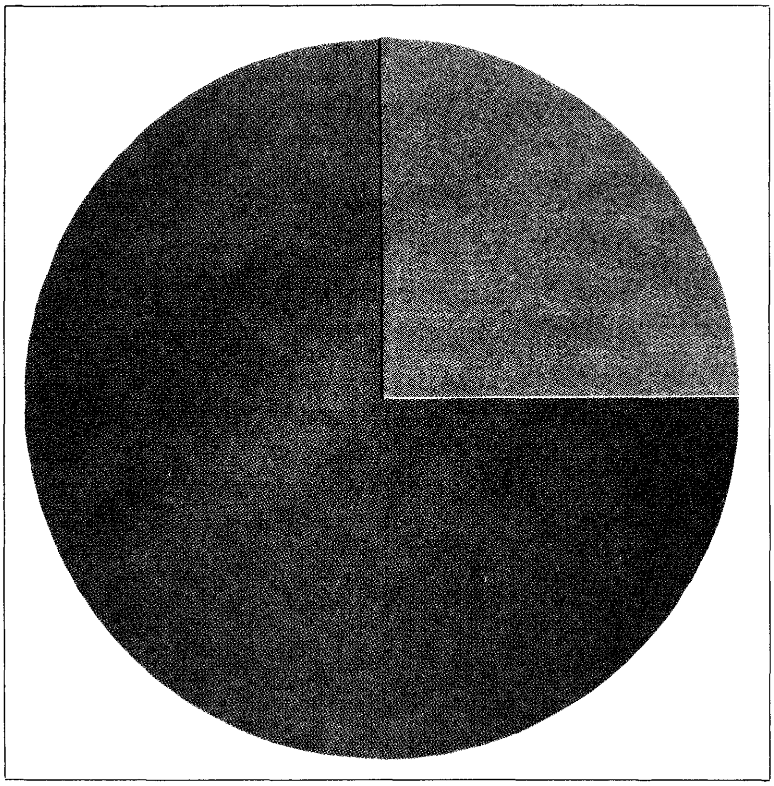


FIGURE 1. **Graphics quickly establish relationships between elements.**

This is true for all graphics printer technologies including ink jet, thermal transfer, electrostatic and laser. Because of the matrix pattern, lines tend to have a jagged or stepped appearance. Use the dot matrix printer for producing working copy graphics or when high-quality isn't essential. (For more information on printers, see the story elsewhere in this issue.)

Plotters, on the other hand, were tailor-made for producing high-quality presentation graphics because they draw continuous line segments from one point to another with a pen. Quality plotters can make up to 1,000 separate line segments in one inch, while most printers achieve only 70 to 150 dots per inch.

Obviously, lines drawn by a plotter are smoother than those produced by a printer. And since plotters are designed specifically to produce graphics, they have media, pen color and software advantages printers cannot match.

PLOTTER OPTIONS

There are several high-quality plotters on the market that will turn your Touchscreen into a graphic artist. Most fall into the $700 to $2,500 price range. But before you make a significant investment in a graphics tool, there are several factors that will influence your purchase decision:

- **Software Support.** It's the software that makes graphics easy. Much of the graphics software now available has been designed for non-programmers. Often, all you'll need to do is select a graphics format from an on-screen menu and enter the appropriate data in response to prompts from the computer. And if you choose software designed specifically for the Touchscreen, you can select pen color, type styles, shading and other options simply by touching the screen.
- **Line Quality.** Line quality is based on two plotter specifications: mechanical resolution (the smallest move a pen can make) and addressable resolution (the smallest move you can ask the plotter to make). The smaller the resolution, the better the line quality.
- **Plotting Time.** Although it may not seem important now, speed will be an important quality as you learn to produce complex or highly-colored graphics. Known to jargonists as "throughput," it is simply the time required to complete a graphic. The most important specifications are pen speed and acceleration. Each plot program contains a number of starts and stops, and the pen must accelerate and decelerate for each pen stroke. Without a high acceleration rate, a plotter cannot take advantage of a high pen speed, and the drawing will have a longer plotting time. Fast plotters have at least 1g acceleration.
- **Supplies Support.** Plotter supplies should work together with you and your plotter to produce good, dependable graphics. Consider your applications: On what type of media do you want to make graphics? What color pens will you need? How many pens? Be sure these supplies are easily obtainable.
- **Internal Intelligence.** An intelligent plotter can produce complex plots with only a few instructions from the software, freeing your computer for other tasks. Most quality plotters have a microprocessor containing commands to simplify the drawing of circles, dashed lines and letters. For example, when drawing a circle with some intelligent plotters, all you need to define are the center point and the radius. In contrast, it may require more than 100 commands to draw the same circle with a plotter containing less internal intelligence.
- **Ease of Use.** If a plotter is difficult to operate, it will hinder, rather than help increase, your productivity. Are pens easy to load? Does paper load easily? Are panel controls simple and clearly labeled?
- **Ergonomics.** To be used effectively, a

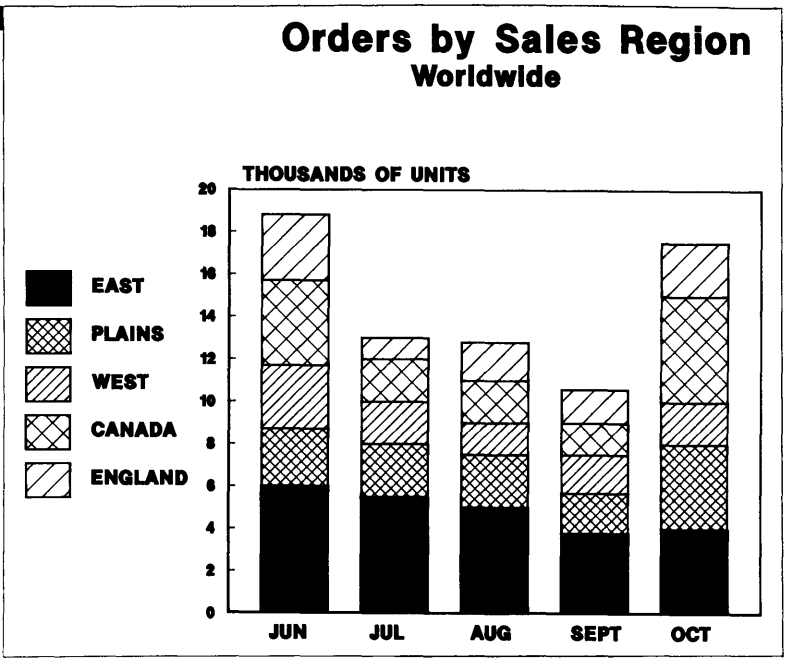


FIGURE 2. **Information graphics—bar chart.**

plotter must fit into your work environment. Some plotters take up less space than others. Some are noisier than others. Determine who will use the plotter, where it will be installed and what it will be used for.

- **Reliability and Service.** The final test of a plotter is reliability. Obviously, if a plotter won't perform when and as required, it's of no use. Look for sturdy machines that will survive in your work environment. If you can, speak with someone who uses the plotter you're considering. And since even the most reliable equipment will sometimes fail, check for the availability of an acceptable service contract at a reasonable price.

GRAPHIC OPTIONS

The toughest part of learning to use graphics is determining which types of graphics work best in specific situations. Each type falls into three primary categories: information graphics, report graphics and presentation graphics.

Information graphics are generally for your own informal use. Consider them throwaways to help solve immediate problems. A common type of information graphic might be a bar chart that breaks down regional sales on a month-to-month basis (Figure 2). Information graphics can be made successfully on most printers.

Report graphics, as the name implies, are used in reports or distributed as handouts. These graphics should be as simple as possible and each should make only one point. The reader should not have to spend an excessive amount of time trying to decipher the message. For formal reports, your best bet is a plotter.

Presentation graphics are visual aids to help support your point, focus attention on a specific detail or clarify your meaning. These charts must be visible from anywhere in the meeting room, be clear and understandable at a glance and carry only essential information (Figure 3).

Plotters can give you the high quality needed for presentation graphics, particularly if you're using overhead transparencies.

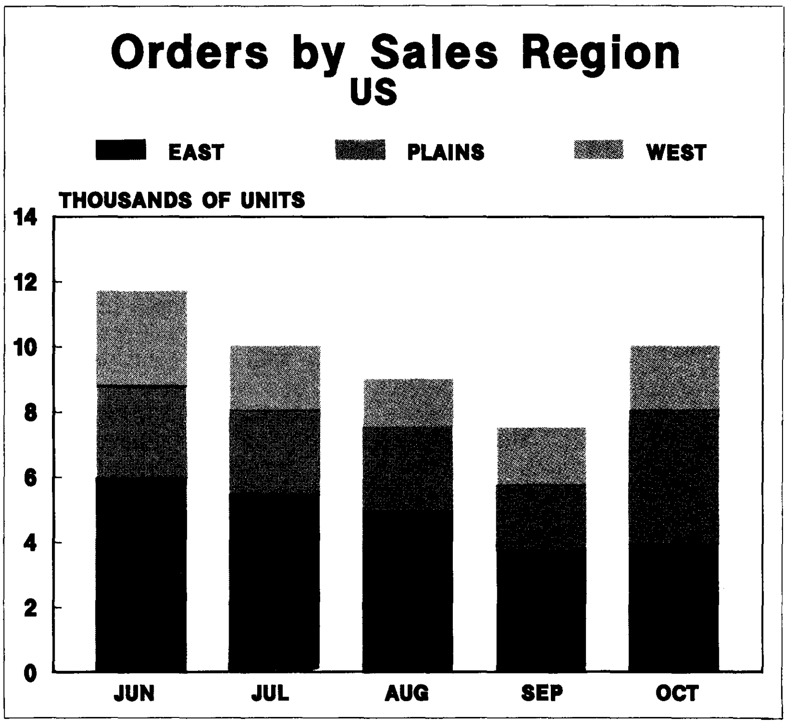
The Touchcreen is capable of an almost limitless number of graphics formats. Finding the right graphic may involve a certain amount of trial and error until you discover the perfect combination. Fortunately, working out your best style is relatively easy on the Touchscreen, especially if your graphics software allows you to use HPTouch. Here are some of the possibilities:

- **Line and column charts** best express changes in data over time. A line chart (Figure 4) illustrates directions of change or movement over a period of time and is useful for clear graphic presentation.

Column, or vertical bar, charts are excellent for stressing the differences between elements involving a few separate periods of time, especially when showing significant changes from one period to another.

- **Bar charts**, or horizontal column charts, are most often used for comparing one set of data to another. The formats are similar to vertical column charts in that they may be grouped, stacked or shown as deviations to a base line. Bar charts involve comparisons that do not include time (Figure 5).
- **Pie Charts** are used to compare parts of a whole (Figure 5). They show relationships to

FIGURE 3. **Presentation graphics—bar chart.**



If a plotter is difficult to operate, it will hinder, rather than help increase, your productivity.

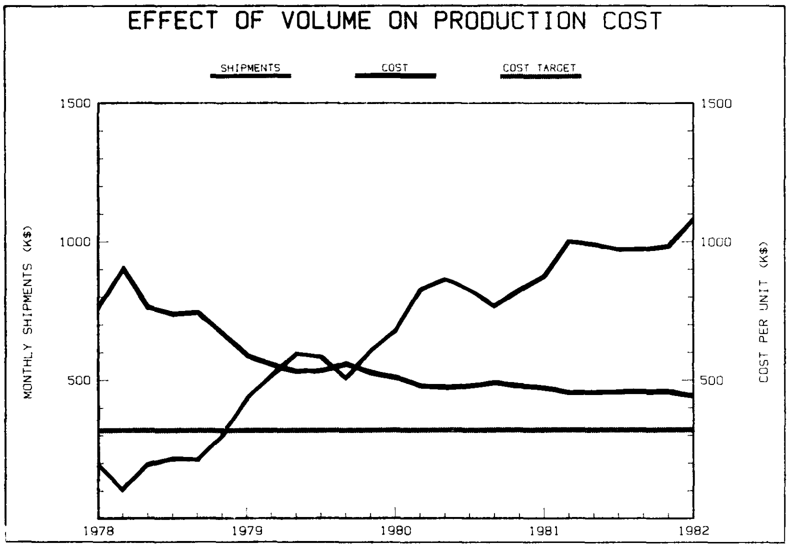


FIGURE 4. **Line charts express data in changes over time.**

parts of a whole and are best used with fewer than six elements.

CREATIVE OPTIONS

You don't need to be a graphic artist to create professional-looking graphics with a microcomputer. But experts have devised certain strategies to ensure the production of high-quality, easily understood charts and graphs.

Good graphics don't just happen. Take some time to plan ahead, making sure your information will be direct, simple, clear and accurate. In other words, focus on one idea, avoid needless detail, use familiar terminology and check your facts.

If you plan to use several graphics in one report or presentation, plan them together. Unity of style, color, lettering and format will enhance the usefulness of the graphics.

Artists use four design principles: simplicity, unity, emphasis and balance. Simplicity means using as little information and as few elements as possible. For example, building a sequence of charts is often more effective than presenting all your data as a complex single unit.

Unity is the relationship among all the elements that make them function as a whole rather than as separate parts. Too much space between elements, for example, can divide a chart into sections that seem more important than the whole.

Emphasis gives one element more importance than the others. It becomes the center of attention without destroying the unity of the chart. You might emphasize one slice of a pie chart by separating or "exploding" it from the rest of the chart.

GRAPHICS SOFTWARE FOR THE TOUCHSCREEN

Much of today's graphics software is menu-driven and so user-friendly that you don't have to be a programmer to create professional-looking graphics. The Touchscreen is supported by many software packages, including the ones listed below. For more information about these software packages, contact a Touchscreen dealer or software supplier. All prices are manufacturers' suggested retail price.

1-2-3
Lotus Development Corporation
161 First St.
Cambridge, MA 02142
(800) 343-5414
$495

Context MBA
Context Management Systems
23868 Hawthorne Blvd., Suite 101
Torrence, CA 90505
(213) 378-8277
$695

GraphPlan
Chang Laboratories Inc.
5300 Stevens Creek Blvd.
San Jose, CA 95129
(408) 246-8020
$295

Graphwriter
Graphic Communications Inc.
200 Fifth Ave.
Waltham, MA 02254
(617) 890-8778
$595

Picture Perfect
Computer Support Corporation
4215 Beltwood Pkwy.
Dallas, TX 75234
(214) 661-8960
HP product #45462A
$295

Series 100/Graphics
Hewlett-Packard Company
P.O. Box 60008
Sunnyvale, CA 94088
(800) 538-8787;
in California, (408) 738-4133
HP product #45410A
$300

Balance achieves equilibrium so that one part of the chart doesn't appear to be heavier than the others. Formal balance, where the elements of the chart are equal in size or weight and are located an equal distance from the center, is most common in business graphics. Informal balance is asymmetric, using elements that are unequal in size or weight.

In some cases, several small elements may balance one larger element. Informal balance can be refreshing, adding interest to an otherwise uninspiring chart.

Color is an excellent tool for showing different elements and indicating the kinds of comparisons you want the audience to make. If a line chart has four lines, for example, choosing four colors will help viewers make comparisons in the trends. But if you make three lines one color and the fourth line another color, your audience will focus on the different colored line, comparing it to the other three.

When it is important to identify parallel levels of information in a series of charts, consistent use of the same color to indicate levels of equal importance can be effective. Or, the same color can be used to identify the similar segments. This makes it easy to see how one segment changes from pie chart to pie chart.

For charts and diagrams, a maximum of five colors is recommended. For presentation graphics that contain only text, use just two colors. Text usually should be black with the second color used for emphasis.

Keep in mind that color is the most dynamic element of most graphics. Studies show that color graphics are 80 percent more effective than black and white graphics. But even though color can add impact and interest, it won't make a bad chart good.

WHAT GRAPHICS CAN DO FOR YOU

Graphics are one of the best ways to improve your communication skills and productivity. When designed correctly and used effectively, graphics:

- emphasize relationships;
- make hidden facts more obvious;
- save analytical time;
- improve audience recall;
- instill a sense of order and sequence in a report or presentation;
- establish a common starting point for the audience;
- reduce time spent in meetings;
- make translations easier. Most pictures are universally understood.

To lighten the load in your briefcase or see the top of your desk again, try your hand at developing and using graphics. Using the Touchscreen and a quality plotter, you will alleviate even the most severe case of information overload. ☐

Melissa Gerberich is a marketing writer for HP's San Diego division.

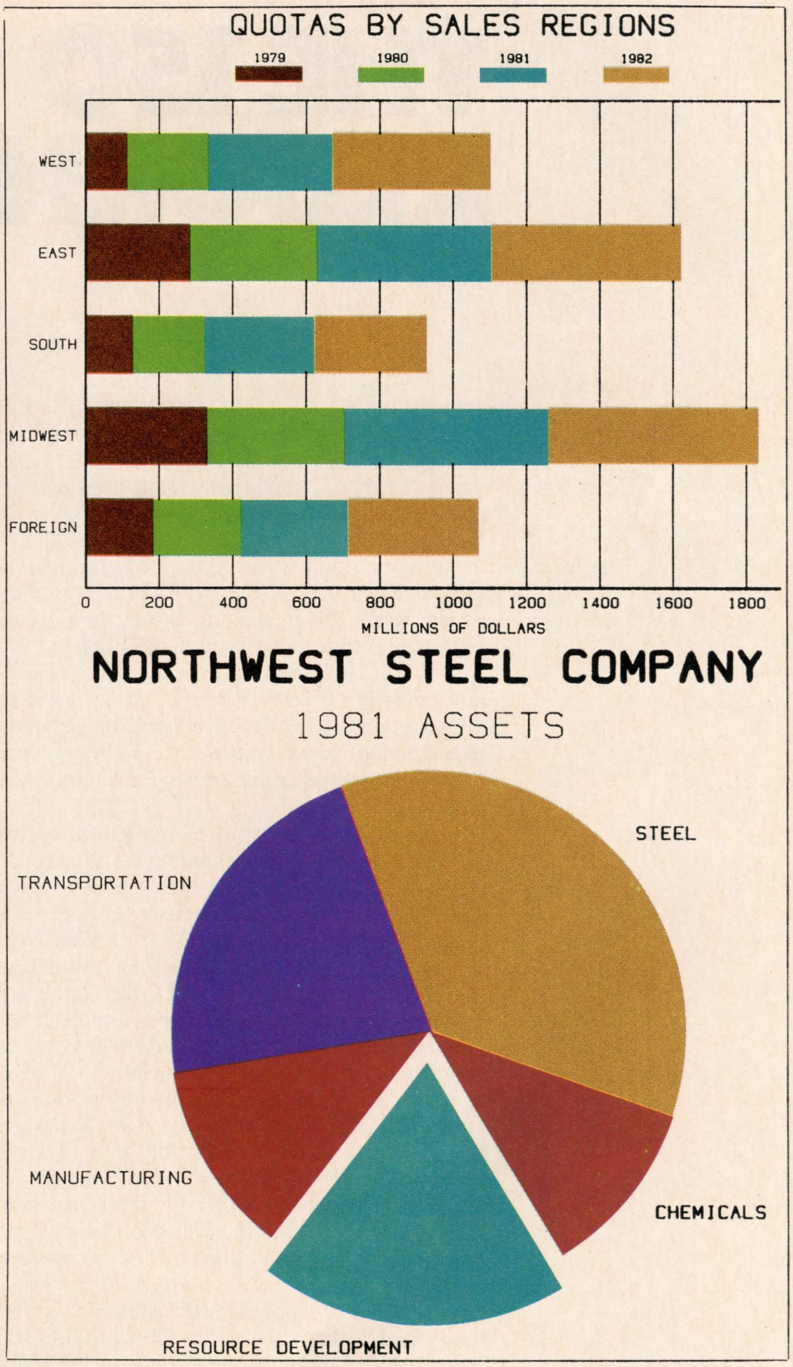
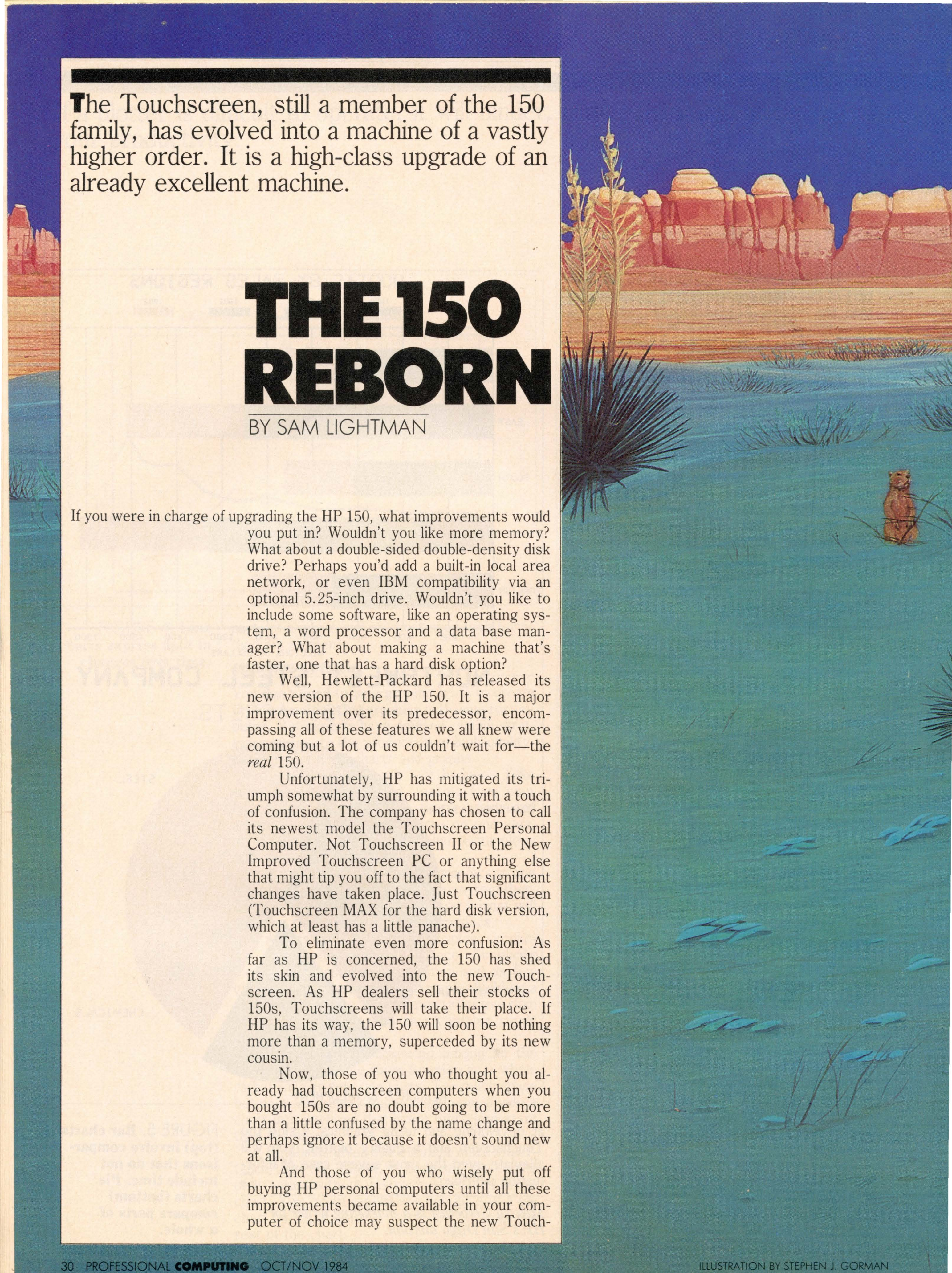


FIGURE 5. **Bar charts (top) involve comparisons that do not include time. Pie charts (bottom) compare parts of a whole.**



The Touchscreen, still a member of the 150 family, has evolved into a machine of a vastly higher order. It is a high-class upgrade of an already excellent machine.

THE 150 REBORN

BY SAM LIGHTMAN

If you were in charge of upgrading the HP 150, what improvements would you put in? Wouldn't you like more memory? What about a double-sided double-density disk drive? Perhaps you'd add a built-in local area network, or even IBM compatibility via an optional 5.25-inch drive. Wouldn't you like to include some software, like an operating system, a word processor and a data base manager? What about making a machine that's faster, one that has a hard disk option?

Well, Hewlett-Packard has released its new version of the HP 150. It is a major improvement over its predecessor, encompassing all of these features we all knew were coming but a lot of us couldn't wait for—the *real* 150.

Unfortunately, HP has mitigated its triumph somewhat by surrounding it with a touch of confusion. The company has chosen to call its newest model the Touchscreen Personal Computer. Not Touchscreen II or the New Improved Touchscreen PC or anything else that might tip you off to the fact that significant changes have taken place. Just Touchscreen (Touchscreen MAX for the hard disk version, which at least has a little panache).

To eliminate even more confusion: As far as HP is concerned, the 150 has shed its skin and evolved into the new Touchscreen. As HP dealers sell their stocks of 150s, Touchscreens will take their place. If HP has its way, the 150 will soon be nothing more than a memory, superceded by its new cousin.

Now, those of you who thought you already had touchscreen computers when you bought 150s are no doubt going to be more than a little confused by the name change and perhaps ignore it because it doesn't sound new at all.

And those of you who wisely put off buying HP personal computers until all these improvements became available in your computer of choice may suspect the new Touch-

ILLUSTRATION BY STEPHEN J. GORMAN

HEWLETT PACKARD
150
CORMAN 84

Electronic RAM lets you use part of your computer's memory as if it were a disk drive, only at microprocessor speeds.

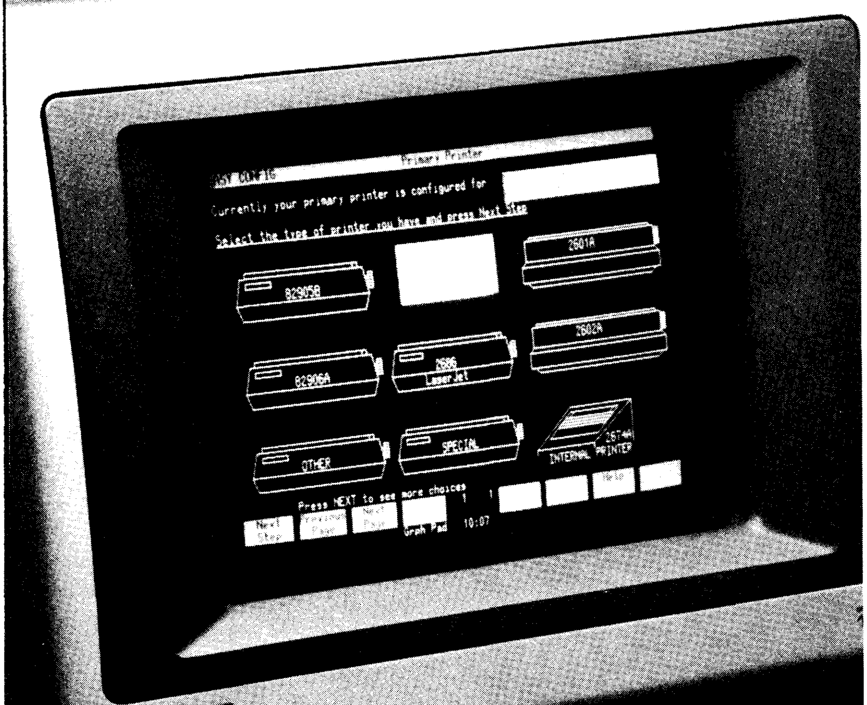
screen ballyhoo is just so much advertising puff and delay your purchase while you wait for something substantive to occur.

In either case, you would be making a mistake. The new Touchscreen has a great deal to recommend it and, as a public service (and a service to HP as well), *Professional Computing* will now explain further why your 150 is not a Touchscreen and why you should upgrade it or buy the new model if you've been holding off.

MORE STORAGE, MORE SPEED

The touchscreen feature was introduced about a year ago in the 150. It represented a significant difference between HP's computer and everyone else's. It was, and remains, a feature which strikes many industry observers as far and away the most natural and intuitive user interface yet conceived.

Combined with soft function keys, the touchscreen makes difficult software products a snap to use and encourages the development of special touch-only applications packages for use by computer illiterates. It is HP's ace in the hole in the competition for market share. According to InfoCorp., an independent marketing firm, HP is in third place in the personal computer marketplace—and the touchscreen is one feature that helped HP gain this position.



Currently your primary printer is configured for

Select the type of printer you have and press Next Step

Press NEXT to see more choices

THE TOUCHSCREEN'S **EASY CONFIG screen allows the user to set up the necessary peripheral configurations with the touch of a finger.**

HP has added several features to the touchscreen and soft key attributes to make it clearly competitive with the best desktop personal computers on the market.

The most important new feature is the double-sided disk drive which provides a whopping 710k of storage on a single 3.5-inch hard-shell microfloppy. You can now store much larger spreadsheets and data bases on these new disks—nearly twice as much as on conventional double-sided, double-density 5.25-inch floppies.

This new disk drive, disguised in a package indistinguishable from the old single-sided drive, also puts an end to much of the disk shuffling of the past. Your most often-used programs can now be combined onto one disk and entered together. The Personal Applications Manager (PAM) will then present them to you in the finger-pickin' fashion that we oldtimers have already come to know and love.

You might also want to speed up your work by loading the operating system from the System Master disk to your applications disk. Be sure, however, that there's enough space on the applications disk to load the operating system. For example, the Touchscreen comes with *MemoMaker* and *Personal Card File* on the same double-sided disk, and MS-DOS and PAM on the System Master. According to HP, *Personal Card File* requires so much disk space that loading MS-DOS on the same disk is a technical impossibility.

Common sense tells us that where there is room on a disk, loading MS-DOS (or any operating system) to an applications disk saves you the hassle of booting MS-DOS and then removing the System Master to boot your application. The problem with circumventing this process is a legal one: How will MicroSoft feel about thousands of users making what amount to unauthorized copies of its proprietary MS-DOS program?

According to Chris Larson, MS-DOS Project Manager for MicroSoft, a single user may legally load MS-DOS from the System Master to an application disk if it is for that user only. If you choose to share your System Master with others who will do the same thing, however, you and the other users are in violation of the company's copyright. But will MicroSoft discover your transgression? If so, will it prosecute? As with many other software rights issues, there are no answers now. Most informed sources believe the issues ultimately will be settled in court within the next few years.

The Winchester hard disk drive in the Touchscreen MAX has also been provided with a double-sided floppy, although you can still buy the hard disk drive without this feature if you prefer.

The operating system is now MS-DOS 2.04, which combines with firmware and hardware improvements to move applications programs and data back and forth between the disks and the CPU at twice the speed of the 150. (Touchscreen MAX is three times faster than its progenitor.) This increase in speed has been accomplished by streamlining the performance of many routines, i.e., removing a lot of the overhead.

RAMDISK AND IBMDISK

Double-sided disk drives and speedier operation are just the beginning of a whole roster of new capabilities offered on the Touchscreen. The new model's firmware now fully supports additional peripherals such as the ThinkJet and LaserJet printers and a tape drive backup for the hard disk. The tape drive is treated as if it were another disk drive; you can do reads and writes and create volume names the same way you would with a hard disk.

One of the best surprises of the new Touchscreen, however, is its support of electronic RAMdisk.

Electronic RAM lets you use part of your computer's memory as if it were a disk drive, only at microprocessor speeds. It transfers files back and forth nearly instantaneously. No more sitting and waiting while the program switches files or writes to disk. For example, RAMdisk will be a tremendous boon to *Personal Card File* users who have become accustomed to going out for coffee while waiting for the program to swap card files.

Be aware, however, that when you turn off the machine, you lose your information. So at some point you still have to transfer that information to floppy disk if you want to save it. Nevertheless, RAMdisk can be a major improvement in speeding up your operation.

HP's RAMdisks come in three convenient sizes. They are essentially the memory expansion cards offered earlier in capacities of 128k, 256k and 384k.

Like its predecessor, the Touchscreen comes with 256k of RAM. You can add up to another 384k with memory expansion cards, only now you can go into the device configuration menu and configure the additional memory as RAMdisk in increments of 4k up to a maximum of 256k. The remainder, if there is any, goes into application memory.

For reasons I have not yet been able to discover, HP does not provide expandable memory boards. If you buy 128k this year and next year you need 256k, you have to throw away your old board and buy a whole new one. You can't just buy the chips or have them installed by your dealer.

Another important addition to HP personal computer capabilities is disk conversion to 5.25-inch IBM format. HP now offers for use with the Touchscreen the 9125S 5.25-inch disk drive which can read, write and initialize 5.25-inch disks in IBM format. Users can now exchange data on 5.25-inch disks between a Touchscreen or MAX and the IBM PC.

HP has been working on the IBM compatibility problem for some time while endeavoring to maintain its independence and steer its own course. Previous moves in the direction of communications with IBM equipment include the IBM plug emulator card, which provides a coaxial cable connection to an IBM host, and the Portable-Desktop Link which enables both old and new touchscreen computers and IBM PCs to share data with The Portable (HP 110). HP also offers a communications software package for the IBM PC that enables it to exchange information via modem with HP computers using DSN/Link software.

A NEW LANSCAPE

For offices where several computers must communicate with each other, the Touchscreen MAX will now support a local area network (LAN).

Designed primarily for the small office of two to eight people, the system is expandable and can theoretically handle as many as 50 terminals, with MAX acting as disk server. LAN is a feature regarded by the management information systems (MIS) community as *sine qua non* to an office system. Their users must be able to share programs and data with each other and with a central storage unit. Until now, HP has been locked out of this market for lack of LAN support. The new Touchscreen eliminates that roadblock.

The network system HP has chosen is the near-industry-standard EtherSeries from 3Com. While the firmware within each terminal is capable of supporting the network, the system also requires an EtherLink interface card in every unit on the net.

Significantly, the network need not be exclusively Touchscreen terminals. It can include IBM PCs, Texas Instrument PCs and other IBM-compatible machines, and they can all share printers and hard disks or even a single disk drive with the addition of a 3Com

The network system HP has chosen is the near-industry-standard EtherNet from 3Com.

facility called EtherShare. All shared facilities will be transparent to all users; that is, they will not be aware of the network during the course of normal computer use.

With LAN, electronic mail and local bulletin boards will also be supported. (For more on the LAN capability, see the sidebars on page 34 and page 35.)

INSTANT PRODUCTIVITY

Probably the single biggest headache associated with the 150 was the documentation. Ordinary users simply could not get their equipment up and running without a lot of hand-holding on the part of the dealer and HPCoach.

Taking the feedback it received from users, Coach and the customer support people servicing major accounts, HP created a model for the kind of documentation it felt was required. The company then took the model to the American Institute of Research (AIR), specialists in the preparation of training materials, and turned the project over to them. AIR reworked the users manual from the ground up and, according to the people who have seen it, wrote a vastly improved document. It now features a structure that is characterized by task description rather than by computer-language command, along with crisper graphics and wider pages.

HP and AIR have provided a substantial library of documentation to accompany the Touchscreen, based on the fact that different users want different information and need to access it quickly. There are now eight (that's

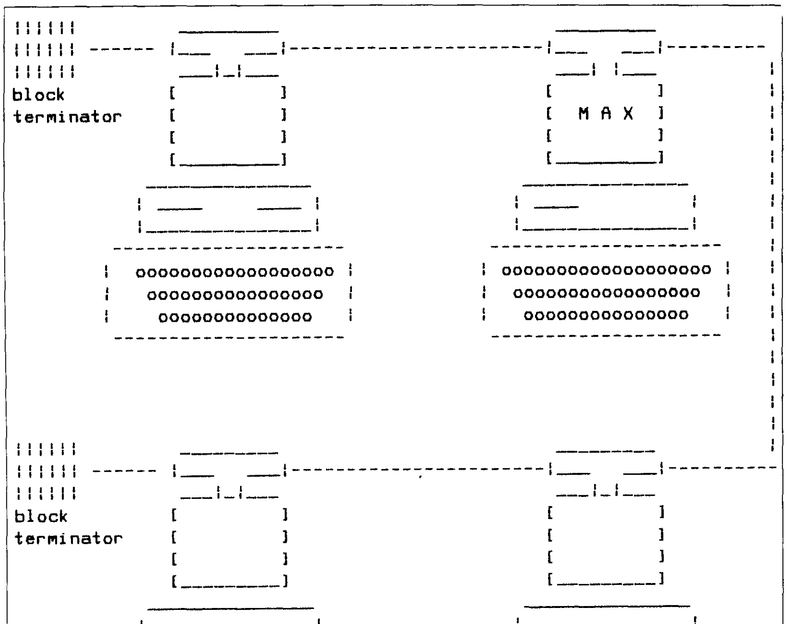
BILL OF MATERIALS

To set up an HP LAN with three Touchscreens and a Touchscreen MAX, here's what you need and what it will cost:

Product #	Description	Quantity needed	Price
45644A	EtherLink/150	4	$3,400 ($850 each)
45645A	EtherShare Software	1	695
45646A	EtherPrint Software	1	595
45647A	EtherMail Software	1	850
45691A	Thin EtherNet Cable (7 meters)	1	20
45692A	Thin EtherNet Cable (15 meters)	1	30
45693A	Thin EtherNet Cable (30 meters)	1	50
45695A	Thin EtherNet Terminator Kit	1	25
45698A	Loopback Plug	1	25
			$5,690

This configuration assumes the use of standard lengths of Thin EtherNet Cable (7, 15 or 30 meters), but custom lengths are available from HP at $20 plus $1/meter. HP will support a maximum network length of 304.8 meters although the system listed here has a physical limitation of 1,500 meters. Through the use of Thick EtherNet Cable and repeaters (from 3Com) the system can be expanded to 10 kilometers. (Each EtherLink package contains one T-connector, and each Terminator kit contains two block terminators.)

SCHEMATIC OF **a typical four-user HP LAN. MAX acts as the server.**



WELCOME TO THE PROMISED LAN

3Com, maker of the EtherNet system offered by HP with its new Touchscreen, defines a local area network (LAN) as follows: "A high-speed communication system used to share hardware resources, programs and data files. It allows easy circulation of ideas and data within an office, a building or a complex of closely spaced buildings."

To which HP adds: "A combination of hardware and software that moves large amounts of information at relatively high speeds over limited distances within a single facility or site. Typical characteristics:

- limited geographic area, 1-10 kilometers;
- moderate to high data rate, .1-100 Mbit/s (EtherNet/150 speed = 10 Mbit/s);
- inexpensive media;
- high connectivity and access;
- decentralized control;
- connecting device independence;
- user premises and control."

In other words, the Touchscreen's new LAN capabilities will be welcome to small and middle-size offices that want to share data bases, files, spreadsheets, programs and peripherals among several users.

ECONOMY AND PRODUCTIVITY

The principal benefits are economy and productivity. Clearly, the ability to share a single printer—say a $3,000 LaserJet—among several users in a small office is more cost-effective than supplying every user with a letter-quality printer. Similarly, a 30M Winchester becomes economically justifiable when several people can share it.

Further, the ability to share data bases, files, spreadsheets and other information among the various users will have a favorable impact on office productivity.

How is all this sharing accomplished?

A network consists of a workstation for each person who needs it, plus one central computer with a hard disk acting as network "server" or coordinator. Depending upon the amount of computational power needed, the workstation may be a "dumb" terminal with no processing power, a "smart" terminal with processing power but no disk storage, or a full-out desktop personal computer.

Each HP LAN workstation has a networking circuit board (EtherLink/150) in one of its expansion slots, and is cabled to the server through that board.

Through the accompanying software (EtherShare/150), the hard disk is divided into as many as four sectors which the workstations perceive as individual disk drives. Within these disk drives, volumes are defined for various files and programs.

These volumes can be designated as "public," accessed by everyone on the network, or "private," accessed only through assigned passwords. Everyone might have access to the word processing program, for example, but only the boss and the bookkeeper might have access to the payroll records.

TRANSPARENCY

Most important is the transparency of the system. Although there is considerable structure, as well as other users, between any given user and the files he addresses, the system must respond to each user individually. The structure must be transparent, acting as though only one person is on the system.

The foregoing applies to shared peripherals (through EtherPrint/150 software) as well as to shared files. You send data to a printer or plotter which is being shared by several others in the office as if it were your own. The server then organizes the queue of files waiting to be printed.

Electronic mail within the network requires still another software package, called EtherMail/150.

In the HP system, a server can handle up to eight users, but additional users can be added by adding another server per eight users, up to a total of 100 users, all coordinated. Other 3Com systems which might encompass an HP LAN can support up to a total of 1,000 users.

Workstations can be HP Touchscreens or IBM PCs and still qualify for HP support. However, customers with existing IBM-compatible equipment such as the TI Professional, Televideo and Compaq, will find no impediment to their use on the HP network, although HP will not support them.

When IBM PCs and Touchscreens are used on the same network, application programs will have to be designated on an individual basis. For example, *HP Touch WordStar* will not work on the IBM PC and vice versa. Accordingly, both programs would be loaded into the hard disk and assigned to the various workstations by password to prevent an incompatible program from winding up at the wrong workstation.

AIR reworked the users manual from the ground up, and . . . wrote a vastly improved document.

right, eight) volumes, enough to satisfy any user. One manual tells you how to use the Touchscreen. Another is dedicated to helping you connect printers, plotters and disk drives, and others discuss *MemoMaker*, *Personal Card File* and using the Touchscreen as a terminal. Unfortunately, none of the manuals were available for review at press time.

AIR also came up with another first for HP—a "cookbook" manual which promises to enable you to get your Touchscreen up and running in an hour, ready to go to work.

Another considerable accomplishment in the direction of instant productivity is the new EASY CONFIG utility. Once you have your equipment cabled up, you insert your operating system disk and bring up PAM to the screen. One of the choices presented is EASY CONFIG. Selecting it shows icons of all the peripherals you might be using—disk drives, printer, plotter, internal printer, what have you. Touching each appropriate icon automatically configures your system for that peripheral. Couldn't be easier.

Once you get your Touchscreen up and running, what can you do with it? Why, naturally, you can write a memo to your boss saying you've got your Touchscreen up and running—with *MemoMaker*. After that, you can begin entering your little black book into *Personal Card File*.

In other words, HP has put together a complete package aimed at making you productive with the Touchscreen from the day it arrives on your desk. Undoubtedly there will still be problems, but the company has made some giant strides in the right direction.

SIMILARITIES AND DISAPPOINTMENTS

Major surgery notwithstanding, the new Touchscreen remains similar to the original in several areas, including its appearance; its two serial RS-232 ports for printer and communication links; its HP-IB (interface bus) for driving disk drives, printers, plotters, electronic instruments, automatic test equipment and other esoteric devices that engineers like to control with HP computers; and its two expansion slots, a limitation we'll look at below.

The keyboard is unchanged, more's the pity. This keyboard, as we have reported in previous issues, is betwixt and between: Its touch is too light for the hunt-and-peckers who have been accustomed to pounding earlier, even more recalcitrant HP equipment, and too sticky and noisy for touch typists, more and

HP'S NEW **Touchscreen PC runs all existing software for the 150, with horizons widening every day.**

more of whom will be using HP personal computers in the future.

The exquisitely high-resolution monochrome monitor also remains unchanged, as does the internal thermal printer. Eventually HP probably will redesign the monitor around some special version of the brilliant new ThinkJet printer instead of the thermal, but for the moment, that peripheral remains unchanged. Eventually, too, we can expect to see a color monitor, but so far, nothing doing.

RAMdisk and LAN are two exciting additions to the new Touchscreen's capabilities, but they do leave one to wonder about the computer's paucity of expansion slots. If you need communications in a big way and you install the currently available internal modem card into one slot and an EtherLink card for your LAN into the other, that's as far as you can go. You have no room left for memory expansion or RAMdisk or any other accessories HP sees fit to introduce in the future. (By comparison, the IBM PC has five expansion slots.)

When I asked an HP spokesperson about the possibility of an expansion module, his response suggested that some independent hardware vendor might someday remedy the situation.

Well, okay, but no matter where the answer comes from, the price you'll pay for that small Touchscreen footprint will be a stack of external accessories on your desk—modem, expansion module, printer buffer and so forth, thereby defeating the value of the compact footprint—unless, of course, HP comes up with some other approach to this problem. At the moment, the company doesn't appear to be thinking about it.

THE BEST NEWS

On balance, the Touchscreen is a superior product which provides superb performance for almost any application you can imagine. It is tempting to say that this is the product which HP should have come to market with a year ago, but upgrades always look obvious in hindsight.

Clearly, however, all of this performance doesn't come cheaply. The best news is that it doesn't come all that expensively either.

At this writing, the price of the new Touchscreen is $3,495*, same as the most recent price of the 150. And don't forget this includes the double-sided disk drives as well as the operating system, *MemoMaker* and *Personal Card File*.

Price of the Touchscreen MAX—$5,495.

And where is HP leaving all us HP 150 buyers of yesteryear? In pretty good shape, actually.

For $215 plus a $50 installation charge you can purchase a mini-upgrade kit which includes the new ROMs, a System Master disk, the Applications Master (without *MemoMaker* and *Personal Card File*), a Utility Master with MS-DOS commands, and documentation updates.

The full upgrade kit, for $375 plus $50 installation, includes new ROMs, a System Master disk with MS-DOS and a couple of games, the Applications Master with *Personal Card File* and *MemoMaker*, a system demo disk, the complete documentation set and two quick reference cards.

For $425, you can have your HP dealer or local HP office install an update firmware kit that will make your 150 think it's a brand-new Touchscreen.

With the update kit come certain purchase credits: $200 towards the purchase of the new double-sided microfloppy disk drive for your hard disk system, and $650 towards a new $3,650 Winchester with integral double-sided disk drive.

Turn in your single-sided microfloppy dual drive and you get $400 off the purchase of a $1,270 double-sided dual drive. Your existing disks, incidentally, will run on the new drives, but HP recommends you copy all your programs and files onto new double-sided media. The old media tend to cause unacceptable head wear on the new drives.

HP still hasn't managed to do their networking at the bargain-basement price I wished for—the EtherLink expansion cards will cost you $850 per unit—but they've certainly taken a large stride in the right direction.

All things considered, the RAMdisk is a feature I've long craved, but the double-sided 710k disk drive is the bell-ringer in the lineup. At the moment, it is unique to the Touchscreen models and adds immeasurably to the attractiveness of the overall package.

HP's sales have taken the company to a strong position in the market in spite of a premier entry with some significant deficiencies. With the new Touchscreen models and a rapidly growing list of available software to go with them, HP now has a system that can only serve to strengthen, and even improve on, that position. □

Sam Lightman is a Professional Computing *contributing editor.*

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*All prices shown are preliminary and subject to change.

Packaged software has freed users from having to write their own programs. But programming has its own rewards. Is it for you?

BASIC TINKERING

BY BILL CROW

"Yessiree," the salesman drawled as he patted the new desktop computer's shiny plastic cover. "This little baby's got 64k-RAM-24k-ROM-280-processor-dual-double-density-floppy-disks-centronics-compatible-parallel-printer-port-RS232C-serial-communications-port-integral-battery-backed-up-real-time-clock-eight-level-vector-priority-interrupts-CP/M-2.0-operating-system-and-a-Basic-interpreter. . . ." Staring at the customer (naive enough to ask what a computer could do), the salesman delivered the clincher: "With the right program, this sweetheart will solve every problem you'll ever have."

Since they first became available for the masses, personal computers have invariably included a Basic interpreter as part of the machine's standard built-in software. In those early days of personal computing, applications software was virtually non-existent, and the computer market was restricted to users capable of writing their own programs. Most of the programming was written in Basic.

Despite its limited capabilities and unstructured syntax, Basic still dominates as an end-user programming language. Software hackers have reveled in its interactive virtues while pushing it to the limits with Peeks and Pokes, compilers, accelerators and assembly language subroutines. Hardware hackers still take quickly to Basic's simple syntax and straightforward structure. Neophytes struggle through gruesome classes, trying to program a computer to solve a problem before they have figured out how to solve the problem themselves. In the early days, if you didn't learn how to program, your computer was little more than an expensive desk ornament.

PLENTY OF STORE-BOUGHT SOFTWARE

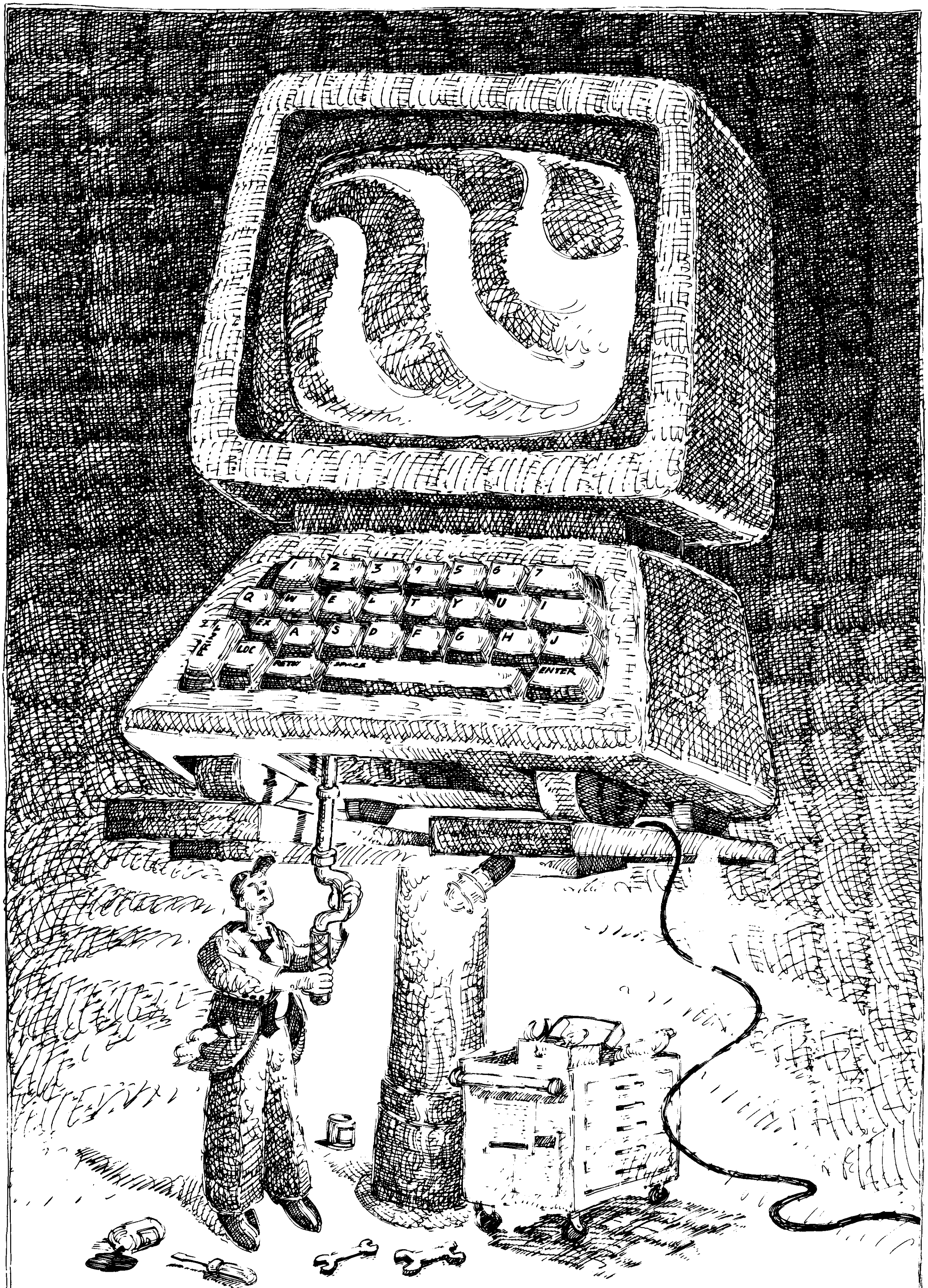
Today, there is a software solution for almost every conceivable application problem. For tasks requiring custom solutions, there is a broad range of sophisticated tools—from spreadsheets to data management systems—that offer the needed flexibility but don't require a low-level language to customize them for a particular application.

The overwhelming majority of computers sold today include a Basic language interpreter as standard equipment. In the most popular systems on the market—Apple II, Commodore 64, IBM PC and numerous others—Basic is actually encoded in read-only memory (ROM) as an integral part of the computer's hardware. But reflecting the easy availability of applications programs, a handful of manufacturers have eliminated Basic as standard equipment for some of their products, offering it as an extra-cost option. Basic, stored in ROM in the Apple II, is an optional product from MicroSoft for Apple's Macintosh. Likewise, Basic is contained in ROM in HP's Series 70 and Series 80 personal computers, and has been the backbone of the Series 200 family. But the Series 100 line is HP's first personal computer offered without Basic. The Touchscreen Personal Computer stores only the terminal emulation program in ROM. HP's 110, known as The Portable, heralds the future of integrated software; several application programs are permanently etched on the machine's ROM chip. The message is clear: You don't need to know how to program to operate the computer.

Even so, novice computer users still wonder if they must learn programming to get the most from their computers. Are the advantages of knowing how to program worth the time and trouble it takes to learn it?

Because there are so many variables, there is no single, easy answer to that question. To help you decide, consider this analogy: Do you need to learn auto mechanics to use your car effectively? Obviously, the answer is No.

To carry the analogy further, you might enjoy tinkering with the family car on weekends, changing the oil, adjusting the carbure-


1 2 3 4 5 6 7
Q W E L T Y U I
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E. PETER BONO 1984

Are the advantages of knowing how to program worth the time and trouble it takes to learn it?

tor or replacing the windshield wipers, but it takes considerably more skill to align the front end or service the differential. Developing a *VisiCalc* model or writing a simple Basic program is easily mastered in just a few hours, but it's a far cry from the skills required to develop a data management system or an interactive graphics game. In other words, it can be fun and educational to learn how to program, but, unless you make a career of it, programming doesn't serve a major role in your daily business activities.

In spite of its unsuitability for everyday business requirements, computer programming is an enjoyable pastime that can teach much more than how to talk to your computer. Learning the elements of programming helps you understand the capabilities and limitations of your computer system, making it easier to decide which applications can be enhanced by automation. It can also help you learn to think in a more orderly and logical fashion.

TO LEARN OR NOT TO LEARN?

Learning to program is a lot like learning a foreign language. Anyone who has mastered a second language will tell you that the trick isn't memorization, it's immersion. You can't speak understandable French by substituting the French equivalents to your English vocabulary; you must think in French.

Similarly, learning to program does not depend on memorizing the syntax of the particular programming language. Instead, you must learn to describe a problem's solution as a series of generalized steps. Programming demands a rigorous approach to problem solving. The goal is not just to find the answer, but to develop a sequence of steps that lets someone else derive the answer and generalize those steps for a wide range of input conditions. Programming requires a unique thinking style, different from the one most of us developed growing up. The problem most people experience in mastering the art of programming isn't learning the language, it's forgetting old patterns of thinking.

In the debate over the best language for novice programmers, many argue for Pascal because of its rigorous attention to proper structured techniques and its clearly defined data structures. Others suggest assembly language, arguing you can't learn how to build houses if you haven't first learned to make bricks. And Logo has become popular in recent years because it is designed to encourage the development of problem-solving skills.

For the adult computer user, I recommend Basic. Although it doesn't teach the better habits of structured programming demanded by Pascal, Basic is interactive, instantly letting you experience the results of your work. This frees you from the horrors of using an editor, compiler and linker just to make a program run. Compared with Pascal's data structures, Basic's data structures are a little crude, but they can still teach the limitations imposed by computers.

Logo is a fascinating language for learning programming and problem-solving techniques, but its sophisticated structure shields users from many common computer constraints. A computer's limitations are as important as its capabilities. The skills developed with Logo are not readily transferable to more practical business uses, such as developing a *Lotus 1-2-3* model, or writing a data base access routine in *dBase II*.

Assembly language can be a kick to learn, revealing a computer's most arcane workings. But returning to the automobile analogy, it's best to become proficient at turning on the engine before trying to replace a crankshaft bearing. Assembly language programming demands a knowledge of computer hardware, the operation of interface circuits and a good grasp of binary and hexidecimal notation. It can be fun, but save it for later.

Basic is not elegant. Nor is it the most sophisticated language available, nor always suited for developing large programs that depend on optimal performance. But it's fairly easy to learn. There are many books on the subject and Basic is available for virtually every computer system. The fundamentals you learn from Basic will allow you to advance to Pascal or Cobol for more serious applications, tackle assembly language if you like to get your hands dirty, or understand Logo to teach your children how to program. The fundamental knowledge of data types, program logic and numerical expressions is also useful when working with most spreadsheet or data management programs.

If your computer is a necessary evil required to complete your daily work, then the last thing you should attempt to learn is programming.

If you find computers challenging and enjoyable, however, then learning to program can be a rewarding experience. It's unfortunate that companies like Apple and HP do not include a programming language such as Basic with their newest computers designed for novice users. Self-programming is certainly not required with the wealth of application software available, but it can be an exciting pastime that sharpens your mental skills. ☐

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Surprise! Your HP 86 is more powerful than you think and all the extra power is free.

THERE'S GOLD IN THEM DISKS

BY GORDON S. BUCK

Unless you've studied the HP 86 demonstration disk, you're in for a pleasant surprise—your 86 is more powerful than you think. Best of all, this extra power is free, or at least won't cost you more than you've already spent.

The extra power comes from the binary routines on the demo disk.

WHAT ARE BINARIES?

A binary is a machine-language program. The demo disk binaries add Basic-like commands to the 86. They function like the internal ROM-based commands except the binaries are loaded from mass storage. Since they're written in machine language, binaries execute many times faster than programs written in Basic. Binaries let you do things you can't with Basic.

There are 47 predefined functions and 144 Basic commands and statements in the 86 manual. HP also provides 20 additional commands through the demo disk binaries. To use these commands, simply load the binary programs and execute the commands as instructed on the demo disk. For some reason, neither the operating manual nor the *Introduction to the HP 86* stresses using these binaries.

My system is an 86A with an additional 64k, an 82905B printer, 82913A monitor and single 9130A 5.25-inch disk drive. For the first few months, I didn't try to use the demo disk binaries—learning the operating manual was enough to keep me busy. I've found that most 86 owners have this in common. However, many owners never find out about the binaries or are hesitant to use them.

Binary programs are described briefly in the operating manual. Like Basic programs, binary programs are loaded from disk except that the command is LOADBIN instead of LOAD. Both a binary and a Basic program can be in memory at the same time. In fact, up to five binaries and one Basic program can be stored simultaneously. However, loading a Basic program will scratch the binaries from memory, so you must load Basic programs before loading binaries. (Note: the CHAIN command will load and execute a program without harming the binaries.)

The demonstration disk that comes with your 86 or 87 contains four binary programs: *Util/1*, *Getsave*, *Gdump* and *Askiob*.

Util/1 contains the largest number of commands and has been the most useful binary to me, providing additional control over the cursor and keyboard. It also helps manipulate strings and enhance graphics.

Getsave converts Basic program statements into string data and allows you to merge two programs. It can help transfer programs between different computers. An improved *Getsave* is built into the 86B.

Gdump prints the graphics display on a dot matrix printer.

Askiob determines the system configuration. The model number of the computer, space remaining on a disk, type of disk drive and plotter model number can be determined within a program. This helps to get the same program to run with different peripherals.

Now that you know the binary power available from the demo disk, you need to learn the commands to use the programs. The demo disk program *Cardfile* contains the instructions.

Place your demo disk in the disk drive and type LOAD CARDFILE, press END LINE and then RUN. When the *Cardfile* instructions are displayed, press L to load an existing file. You'll then be prompted for the file name. Enter BINARIES and press END LINE. *Cardfile* reads the disk file named BINARIES and displays a key label menu. K4 is labeled DISPLAY; K5 is labeled PRINT. Either key will get you the instructions for the binaries.

UTIL/1

This is the binary I use most often. I've be-

ILLUSTRATION BY HOWARD LEWIS

Demo disk binaries, written in machine language, add Basic-like commands to the 86 and let you do things you can't with Basic—and much faster.

come so accustomed to some of its commands that I routinely include them in my Basic programs. *Util/1* requires 2,922 bytes and contains 13 usable commands.

The first command is AREAD (string variable). AREAD reads the display. However, the cursor must be in the position of the first character to be read. This is done with the AWRITE [row, column, [string]] command listed after AREAD.

AREAD fills the string variable with characters from the screen. This means the string must be properly dimensioned or specified. I had some problems with AREAD until I realized that a clear display is made of CHR$(13)s (ASCII nulls) and not CHR$(32)s (spaces).

You can move the cursor around the display by using AWRITE and specifying the row and column. The instructions imply that AWRITE is limited to PAGESIZE 16; however, it works just as well for PAGESIZE 24. Notice that the first row is zero instead of one. Also, the first column is zero; the last column is 79. The example that follows moves the cursor to row 10, column 45, writes I MOVED IT, then moves to row 15, column 50 and writes AGAIN. It then moves the cursor to row 10, column 47 and reads X$[1,4] as MOVE.

```
LOADBIN "UTIL/1"
10 CLEAR
20 AWRITE 10,45, "I MOVED IT"
30 AWRITE 15,50, "AGAIN"
40 AWRITE 10,47
50 AREAD X$[1,4]
60 END
RUN
```

After running this example, notice that the cursor doesn't show on the monitor. Press END LINE. The cursor now appears at the left margin on the line just below I MOVED IT. Before pressing END LINE, the cursor was not visible but was positioned at row 10 and column 47 by line 40. Now type in X$[1,4] and press END LINE. The display will show MOVE.

START CRT AT (line) allows you to position the display window. Remember that the 86 uses a 54-line CRT memory in the Alpha mode and 204 lines in the Alphall mode. This command also gave me some problems. START CRT AT uses an absolute numbering system. AWRITE and AREAD use line numbers relative to the current display window. With START CRT AT you can prepare two display screens and flip back and forth between them in your programs.

The following example clears the entire CRT memory to provide 54 blank lines. It then writes PAGE 1 on the first 24-line window and, PAGE 2 on the second. The function keys let you flip between the windows.

```
10 ALPHALL
20 ALPHA
30 PAGESIZE 24
40 START CRT AT 0
50 AWRITE 0,65, "PAGE 1"
60 AWRITE 1,0, "THE FIRST PAGE."
70 START CRT AT 24
80 AWRITE 0,65, "PAGE 2"
90 AWRITE 1,0, "THE SECOND PAGE."
100 START CRT AT 0
110 ON KEY# 1, "PAGE 1" GOTO 160
120 ON KEY# 2, "PAGE 2" GOTO 180
130 ON KEY# 3, "EXIT" GOTO 200
140 KEY LABEL
150 GOTO 150
160 START CRT AT 0
170 GOTO 140
180 START CRT AT 24
190 GOTO 140
200 END
```

Flip between the two pages by pressing K1, then K2. Press K3 to exit from the program. Now hold down the ROLL key. You'll see the two pages rolling down the screen.

The next command, LINPUT, is used exactly as the normal INPUT command except that commas will be accepted as part of the string variable. This allows you to input dates and geographical data as they are normally written. Use caution when entering LINPUT, as syntax errors have been known to cause a crash.

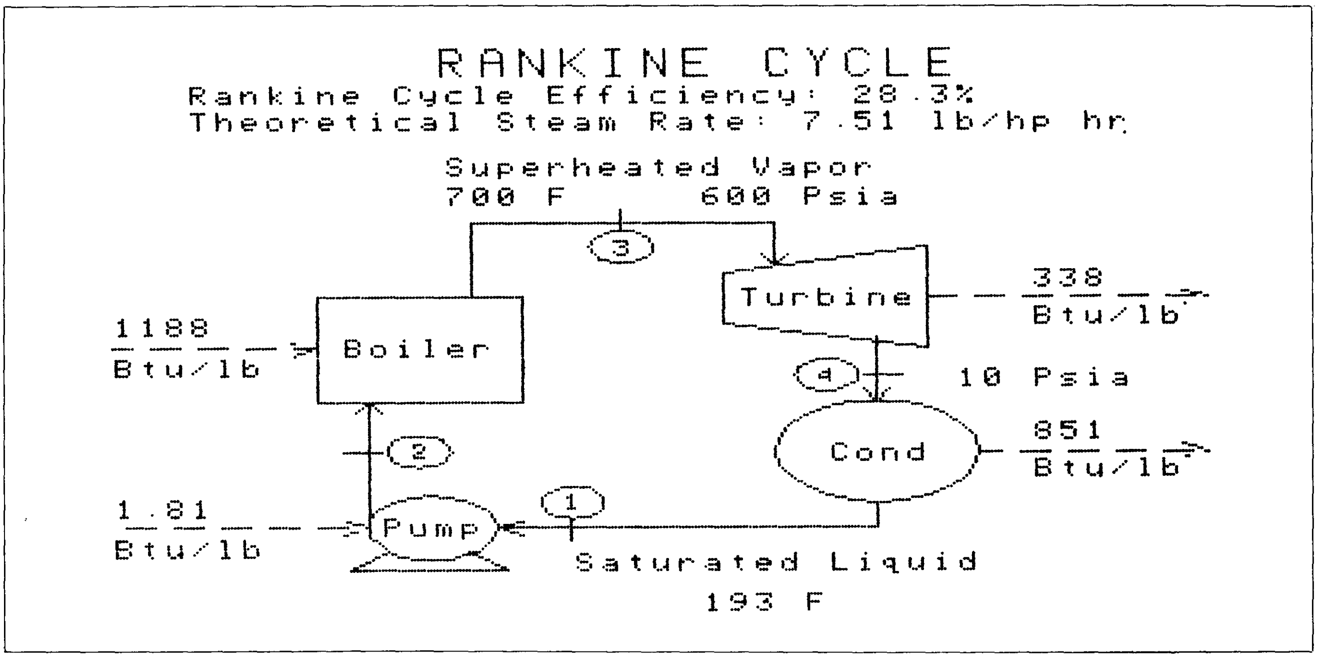
Entering the command UTIL/1 will return the revision number of the binary program.

TAKE KEYBOARD is used to restrict access to the keyboard during program execution. It locks out and puts in a buffer all keys except function keys K1 through 14 and RESET. The instructions say that you must define all function keys even if they're not used. But this doesn't seem to be true in all cases.

KEY$ returns one character from the buffer set up by TAKE KEYBOARD. If you use KEY$, you must use TAKE KEYBOARD first. Failure to do so can crash the system. Using KEY$ reduces the use of the END LINE key when responding to prompts. You can also redefine the entire keyboard if you wish.

RELEASE KEYBOARD is the reverse of TAKE KEYBOARD. If you use TAKE KEYBOARD in your programs, at some critical point you'll forget to put in a RELEASE KEYBOARD. When this happens, the keyboard will be dead. Chalk it up to experience and press RESET.

Here's an example using TAKE KEYBOARD, KEY$ and RELEASE KEYBOARD:



EXAMPLE OF **graphics dump using DUMP GRAPHICS command with the HP 82905B printer.**

```
10 CLEAR
20 TAKE KEYBOARD
30 DISP "ENTER 'Q' WHEN TIRED OF A DEAD
   KEYBOARD"
40 IF KEY$ ⟨ ⟩ "Q" THEN 40
50 DISP "THE KEYBOARD IS WORKING NOW"
60 RELEASE KEYBOARD
70 END
```

FAST LABEL (column, row, string, highlight) is the next command. This is a nice feature to use in graphics displays. It's much faster than using LABEL when writing on the graphics screen.

The first parameter, column, is the alpha column for the first character of the string. Graph-mode columns are numbered from zero to 49. In the Graphall mode, columns are numbered from zero to 67.

The second parameter, row, is given in dots from the top of the screen. Because the row is specified in dots, sometimes more effort is required to position the label; however, the method does give greater flexibility.

The upper left-hand corner of the character block is positioned at the specified row and column. If the entire string can't be written on the specified row starting at that column, the excess characters are written on the next row (one dot lower) starting at column zero.

Remember, in both Graph and Graphall modes, the display has dots numbered from zero to 239. You have no control over character size when using FAST LABEL. The character size is the same as in the Alpha mode. The following shows how FAST LABEL is used:

```
10 GCLEAR
20 GRAPH
30 FAST LABEL 0,0,"0 COLUMN AND 0 ROW",0
40 FAST LABEL 0,10,"0 COLUMN AND 10
   ROW.",1
50 FAST LABEL 29,221, "29 COLUMN AND 221
   ROW.",0
60 FAST LABEL 47,231, "47 COLUMN AND 231
   ROW.", 1
70 END
```

Now change statement 20 to GRAPHALL and run the program again.

SGCLEAR (x1,x2,y1,y2) [, mask] clears a rectangular area of the graphics display. This can save time if you need to redraw only a portion of a graphics display. The x and y values are measured from the lower left corner. Note that the x value will be rounded off to the nearest multiple of eight. Remember that the Graph mode has 400 dots in the x direction; Graphall has 544. Try this example:

```
GCLEAR
FRAME
MOVE 0,0
DRAW 168,100
MOVE 0,100
DRAW 168,0
SGCLEAR 100,300,60,200
```

MSUS$ (".volume") simply returns the mass storage unit specifier of the disk with the

U*til/1* provides additional control over the keyboard and helps you manipulate strings and enhance your graphics.

specified volume label. People with only one disk drive don't seem too interested in this command. Try the command with one of your disks and its label.

RPT$ (string, number) is most easily remembered and described as "repeat the string." It's a nice feature. An example is included with the example for TRIM$.

TRIM$ (string) turns out to be a handy command to use along with AREAD. Remember, AREAD fills the string. I prepare the screen by AWRITEing spaces in the areas to be AREAD. The extraneous spaces that are AREAD can then be removed by TRIM$.

```
10 CLEAR
20 AWRITE 5,20,RPT$(“ ”,18) ! Writes 18 spaces
30 AWRITE 5,20,“13 CHARACTERS”
40 AWRITE 5,20
50 AREAD X$
60 AWRITE 10,0
70 DISP “X$: ”;X$
80 DISP “X$ LENGTH: ” LEN (X$)
90 DISP “TRIMMED STRING: ”;TRIM$ (X$)
100 DISP “TRIMMED STRING LENGTH: ”;LEN
    (TRIM$ (X$))
110 END
```

Since string variables are dimensioned as 18 characters unless otherwise specified, the AREAD command reads the 13 written characters and then an additional five spaces. The LEN command, therefore, correctly shows a length of 18 characters. After trimming with TRIM$, the LEN is 13, the correct length for the intended purpose.

GETSAVE

Getsave lets you store and retrieve Basic programs as string data instead of tokenized (compiled instruction) code. *Getsave* requires 1,480 bytes and has two usable commands, GET and SAVE. With *Getsave,* you can convert an 86/87 Basic program into string data, load the data into an 85 and convert it to program instructions by using the 85 program *Getsav.* My 86 instructions for *Getsave* say that the 85 binary is named *Dgtsav.* However, I couldn't find *Dgtsav* in the HP Users Library. I found and used the 85 binary *Getsav* instead.

I found that the string data stored by *Getsave* can be read by the HP word processing program *Word/80* using the GET command. This means that *Word/80* can be used as a program editor. After editing, use *Getsave* to convert the *Word/80* text file back to a Basic program. However, since *Word/80* expects 80 characters per line and Basic program lines can have 159 characters, Basic statements will be truncated to 80 characters.

Another use for *Getsave* is to merge two Basic programs by SAVEing the first program, loading the second as a Basic program and then GETting the first while the second is in memory. Be certain you have renumbered one of the programs to avoid any conflicts.

The command GETSAVE returns the revision number of the binary.

WHAT MOTHER DIDN'T TELL YOU ABOUT *UTIL/1*

Util/1 was developed in a hurry some time after the final release of the Gemini (86/87) operating system to fill a need for extra screen support, initially in the demo disk programs.

While the program has been widely accepted by Series 80 users, most people don't realize there are some bugs lurking just beneath the surface. Here's a brief rundown of the most common bugs and the cures.

LINPUT (string$). If you mistakenly enter a $ before the string reference, you can crash on the spot. The problem is traceable to some expedient, but faulty, design in the parse routine that pushes bytes before adequate testing has been done on the proposed new program line. Avoid this syntax.

Remedy: Enter LINPUT statements with due care.

KEY$. A program reference to KEY$ without a prior call to TAKE KEYBOARD will crash the program clear back to power on.

Remedy: Make sure you have set up the key buffer first.

START CRT AT (numeric_ref). Executing this statement with a negative value will confuse the CRT controller and cause a sideways wrapped screen.

Remedy: Track the values you plan to use for screen START AT addressing and trap any value less than zero.

TRIM$ (string$). Fails to work on strings longer than 32,767 bytes because of incorrect register usage in the runtime code segment.

Remedy: Don't use strings longer than 32,767 bytes.

RPT$ (string$,number_of_repeats). If you're trying to fill a string longer than 32,767 bytes with a single byte, the function fails because there is a call at input to system routine ONEB when ONEX should have been used. It's probably the result of a hurried conversion of the HP 85 code.

Remedy: If you're filling a long string, do

GDUMP

Since I don't have a plotter, I appreciate *Gdump* more than any other binary. It requires 3,542 bytes and has one usable command, DUMP GRAPHICS. *Gdump* dumps the graphics display onto the printer. With the 82905B printer, my command is simply DUMP GRAPHICS when the graphics are done in Graph mode (see figure).

The full command is DUMP GRAPHICS [lower bound [,upper bound [,rotate [printer type]]]]. The instructions give three printer-type codes for five HP printers. I've been told that the Epson MX80 HP printer will give a good graphics dump if it's identified as an HP 82905A printer (use a negative number to indicate the type of printer). If you have a program that uses graphics, use DUMP GRAPHICS after program execution is complete. The next example shows how DUMP GRAPHICS can be executed from the keyboard.

```
LOADBIN "GDUMP"
SCALE 0,100,0,100
FRAME
PRINTER IS 701,80
DUMP GRAPHICS 0,0,0,0
```

Now put the printer into compressed mode by keying in PRINT CHR$(27)&"&k2S". Repeat the example. Try it again with −1 for the rotate code. This should be useful.

Notice that both the upper and lower bounds were specified as zero. If the lower bound of the scale is zero, this will cause the complete graphics screen to be dumped. If the screen is not scaled from zero, specifying zero as the lower bound will return an error.

The command GDUMP returns the revision number of the binary.

ASKIOB

With *Askiob*, you can determine the system configuration. This can be useful if you are writing programs that run on 86 systems other than your own. *Askiob* requires 1,172 bytes and has four usable commands.

DISK FREE (x,y,msus) will return with x equal to the number of free sectors on the disk at that mass storage unit specifier (msus). Also, y will be equal to the largest contiguous block. Therefore, if x and y are not equal, there are null files on the disk. (There are 1,040 sectors on an empty but initialized disk.)

Executing DISK FREE for a non-initialized disk produces a warning for null data. Assuming you have a disk in the drive at msus d700, try the following example:

```
LOADBIN "ASKIOB"
DISK FREE x,y,":d700"
x
y
```

Entering x then pressing END LINE returns the value for x. The y value is obtained similarly. The value for x is the number of free sectors on the disk. If y is not equal to x, you can PACK the disk to eliminate the null files.

DISK TYPE (msus) will return a one if the disk at that location is an eight-inch or a hard (Winchester) disk. A zero will be returned if the disk is a 5.25-inch or 3.5-inch disk. With your disk still at d700, try:

```
DISK TYPE (":d700")
```

PLOTTER ID (device selector) returns the model number of the plotter located at that address. Not having a plotter, I haven't needed this one, but I know different plotters have different physical limits, numbers of pens and capabilities.

ASKIOB returns the revision number of the binary.

You may not need all 20 of these new commands, but I'll bet some of them can help you right away. Your 86 is now more powerful than ever. ☐

Gordon Buck is a registered engineer in Louisiana and a software developer for the HP Series 80.

---

it twice with a RPT$ value less than the working maximum and concatenate.

Even though some of these problems could have been avoided, one of the most common areas for failure of string functions concerns the reserved memory requirement of these system and binary programs. For the same reason, you can experience a memory overflow error trying such innocuous things as adding a few more bytes to a very long string using the system concatenation operator &.

If you want to add just two bytes to a string 65,000 bytes long, you must have at least 65,000 bytes of free memory for the procedure to succeed. The wait for this relatively simple operation can be pretty annoying.

If you receive a memory overflow error when using these functions (and similar ones in the Advanced Programming ROM), thank the bugs.

Don Person

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Circle #159 on reader service card

WEIGHTLESS IN outer space, astronaut Sally Ride and three HP 41s float freely on the flight deck of the space shuttle Challenger.

HP 41

When communication between the orbiting space shuttle and the ground fails, only the HP 41 stands between a safe re-entry and disaster.

The orbiting space shuttle is in trouble. Communications with the ground are out and the power systems are failing. Soon there won't be enough power for a controlled re-entry. It's time to come home.

The astronauts face a key decision—when to fire the retro rockets. The orbital maneuvering engines must be fired at precisely the right time for the shuttle to reach one of the designated landing sites or it will crash-land or ditch in the ocean.

As the astronauts learn early in their training, the on-board computers are not programmed to calculate deorbit opportunities. Without this critical information from ground controllers, the situation looks hopeless.

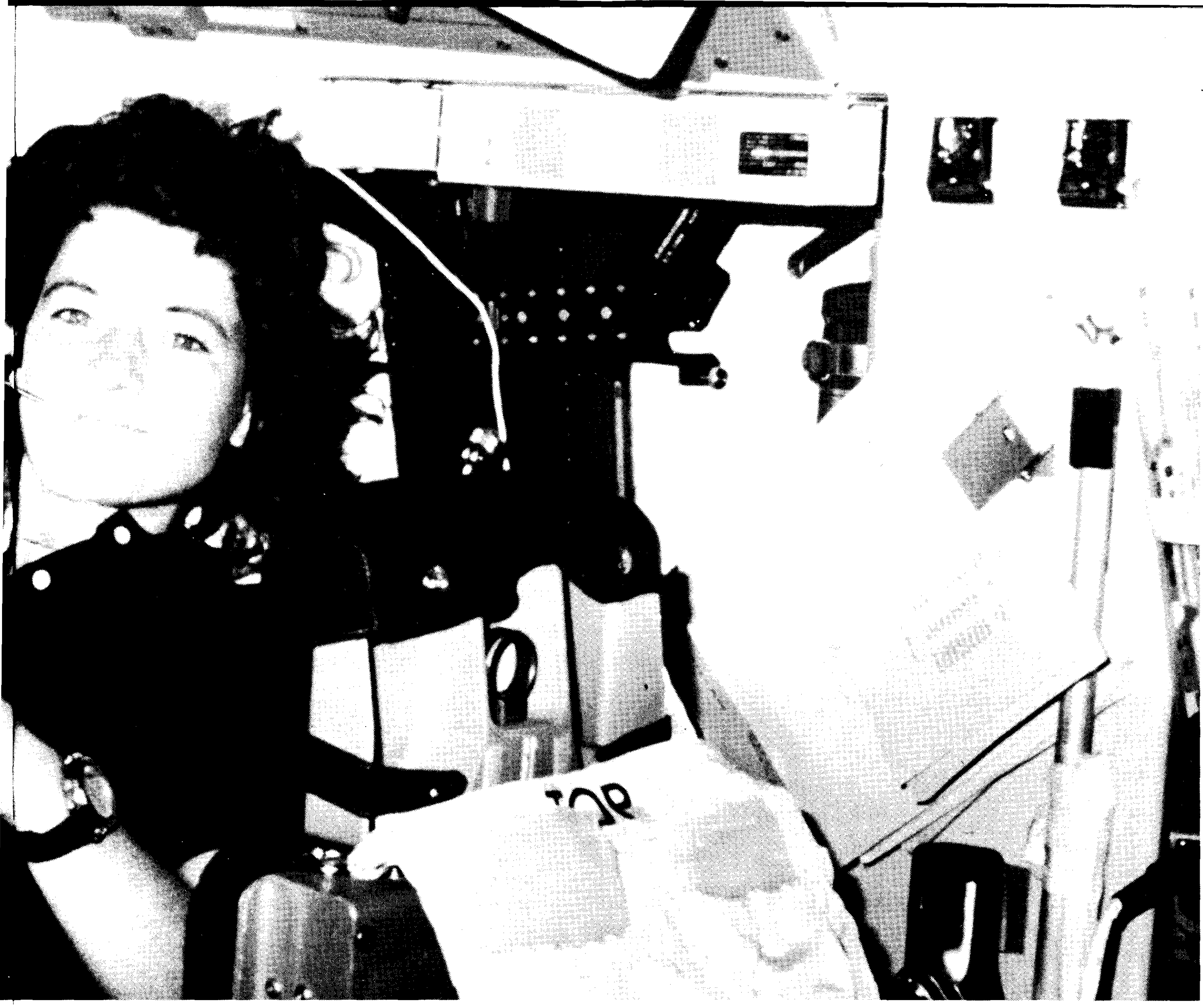
Mission commander Bob Crippen turns to mission specialist Terry Hart with a grin and says, "Go for it, Terry!"

Stuck to a nearby console is a rather fuzzy-looking HP 41, one of several on board. Close inspection reveals that practically every unused surface of the calculator is covered with Velcro, so that in the zero gravity of space it can easily be stuck to any handy surface.

Hart reaches for the 41 and presses a key labeled DEO on the keyboard overlay. The message DEORB READY appears on the display. Hart then presses the NEXT key and DEORB SEARCH is displayed. A series of tones is heard and the display shows

DKR 0.223402

indicating that Dakar, Senegal, is the next landing opportunity and ignition for the deorbit burn will be at 0 days, 22 hours, 34 minutes and 2 seconds mission elapsed



IN ORBIT

BY KEITH JARETT

time—only two minutes away.

As Crippen gets set to fire the engines, Hart presses the R/S (Run/Stop) key and finds out that Dakar is 480 nautical miles north of the shuttle's ground track, well within its glide capabilities.

Once the rockets have been fired, the onboard computers navigate the shuttle to the landing area. The astronauts step out. Another successful mission simulation, thanks to the HP 41.

Emergency situations like this are practiced frequently in flight simulators. Although the 41 has never been needed to compute a deorbit opportunity in flight, it's carried, programmed and ready, on each mission.

WHY THE HP 41

Six months before the first shuttle flight, Terry Hart was asked to find the best calculator for the astronauts. He looked at the TI-59 and the HP 41, the most powerful units available, and decided that the 41's alphanumeric display capability made it the clear winner.

Once he decided on the 41, Hart realized he had more than just the handheld scientific calculator NASA had wanted. He started to look for more complex jobs to use it for. The deorbit program is one example. Computation of a deorbit opportunity would have been easy for the on-board computers, but the software for it never was developed.

Since the 41s would already be on board as general-purpose calculators, Hart began to develop additional programs for them. Assisting in program development were Steve Hoefer of McDonnell-Douglas and NASA's Terry Stanford, who also handled the flight

PHOTO COURTESY OF NASA

Programs developed for the on-board 41s compute the shuttle's center of gravity, its ground track and ignition times for re-entry.

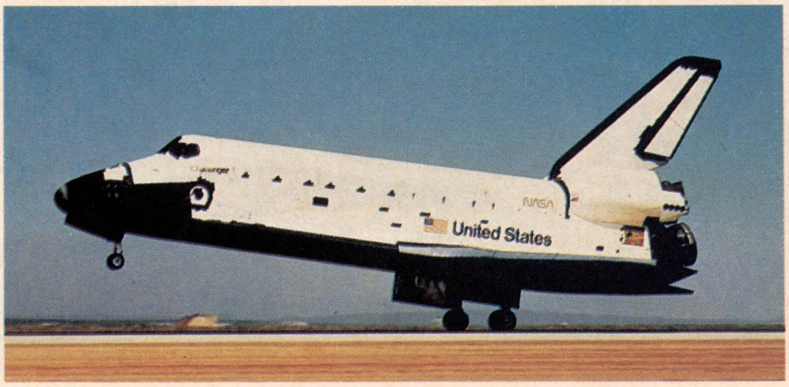
certification of the calculators and programs.

Dave Lamar of NASA is now responsible for 41 program development. Under his direction, new programs are being added for specific mission applications and revisions will probably be made as long as the 41s continue to fly.

SHUTTLE PROGRAMS

CG, the first 41 shuttle program, computes the center of gravity of the orbiter as fuel from the tanks is consumed. Knowing where the orbiter's center of gravity is allows for more efficient orbital maneuvering.

Another program, *Landtrack*, computes the ground track of the shuttle, identifying points of interest on the earth's surface for observation. These two programs were on board the first two shuttle flights.



CHALLENGER LANDING **at Edwards Air Force Base.**

The most widely used 41 shuttle program is *Deorbit/Alarm/AOS*, consisting of three separate sections. *Deorbit*, described earlier, allows the astronauts to compute ignition times for re-entry. *Alarm* provides a convenient way to use the alarm capabilities of the time module, a plug-in for the 41 with an accurate, fully programmable, quartz clock and stopwatch. One function allows alarms to be set relative to the actual time. Another sets alarms in mission-elapsed time and is suitable for deployment sequences or other events fixed relative to launch time. Each alarm can be accompanied by a reminder display selected by the astronaut. Alarms for deployment or other mission sequences can be loaded from magnetic cards or from a cassette drive.

Acquisition of Signal (AOS), which runs continuously throughout the mission, is important because there is direct communication with ground controllers only during passes over one of 13 earth stations. These passes last about 10 minutes, less if the shuttle does not pass directly over the earth station.

AOS beeps at the start of a pass over an earth station and displays the time remaining to loss of signal (LOS). This helps the astronauts make the best use of the short periods of communication available. The program shows the name of the station being passed and whether UHF, S-band (2250 MHz microwave) or both frequencies are available. For example, the display AOS HAWB 7 indicates acquisition of signal from Hawaii, both communication frequencies available and LOS will occur in seven minutes. Each minute, the display counts down to loss of signal.

When LOS is reached, the program uses its knowledge of the shuttle's orbital parameters to predict when the next pass will start. The program also calculates the duration of the pass and the identity of the ground station. This information is used to construct a time module alarm. The program then halts, remaining dormant until the beginning of the next pass. An alarm then wakes up the 41 and starts the countdown to the next LOS.

The key feature of the AOS/LOS program is the interrupting control alarm function of the time module. When the alarm time is reached, the calculator begins to execute the specified program—in this case, displaying the message and counting down to LOS.

Computing AOS and LOS times and then using alarms to control when the messages are displayed overcomes the speed limitations of the 41. Since constant computation is not required, the calculation can be performed at leisure.

The first shuttle flights were made before the time module for the 41 was released. NASA was allowed to use an early version of the module in what has to be the ultimate in pre-production testing. That may be why the time module is one of the most powerful, bug-free and well-documented modules for the 41 ever released. Credit for that goes to Dennis York of HP Corvallis and Martin Richardson, a local HP representative, who supported Terry

NASA TECHNICIAN **demonstrates in-flight use of the HP-41 in the shuttle simulator.**

Hart and the rest of the NASA team by providing the prototype module and software still in the debugging stage.

FEATURES OF THE 41

For several reasons, the 41 was the right machine for NASA. In 1981 it was the most powerful handheld available. It still is, for its size and weight. Some handhelds, including the HP 71, match the 41's computing power in a slightly heavier package. But none of them can match the 41's convenience as a scientific calculator. Furthermore, only the 41 and HP Series 70 machines have the extensive time and alarm features needed by NASA for applications such as acquisition of signal.

Complete keyboard redefinition, introduced with the 41, is important for NASA. There isn't enough time in the training program to teach all the astronauts how to program a 41. The User mode, in which each key activates a program or portion of a program, simplifies the training task because the astronauts only have to be familiar with what the programs do. A keyboard overlay clearly shows the function of each key.

The high degree of customization possible in User mode makes the 41 ideal for use by non-programmers with limited training. This doesn't make the job of the programmers easier, but NASA engineers have come up with a set of programs (*CG*, *Landtrack* and *Deorbit/Alarm/AOS*) that are easy to use.

NASA originally chose the 41 for routine calculations—it certainly is a fine scientific calculator. In reality, the 41s on the space shuttle are hardly ever used simply as nonprogrammable calculators. Most of the time they sit on a console or are stuck to the astronauts' suits and are running the *AOS* or other programs.

In asking for a scientific calculator and getting the 41, NASA ended up with more than it bargained for.

The 41 has other advantages. It's easy to program and virtually impossible to crash because of the high quality of its internal programming.

Because the 41 is battery-powered, it's independent of the shuttle's power systems and can be taken all over the cabin.

NASA can equip each mission with several 41s because they weigh less than seven ounces with batteries. Given the shuttle's tight weight limitations, the 41 is the nearest

SPECIFICATIONS

HP 41CV:
- 320 registers (2240 bytes) of memory
- Four-register stack plus 24-character ALPHA register
- 12-position alphanumeric display
- fully redefinable keyboard with 35 keys
- more than 100 built-in functions (trig, log, arithmetic, statistical, etc.)
- four ports for plug-in modules (preprogrammed modules, extra memory, card reader, etc.)

Extended functions/memory module:
- 47 additional functions including programmable SIZE (data/program register allocation)
- 127 registers of extended memory for off-line storage of programs and data

Extended memory module:
- 238 registers of extended memory for off-line storage of programs and data
- requires extended functions

Time module:
- internal quartz clock and stopwatch
- adjustable accuracy factor to compensate for frequency drift
- 29 time-related functions (stopwatch, alarm, etc.)

PHOTOS COURTESY OF HEWLETT-PACKARD

> **The 41s NASA uses are not specially prepared. They're the same machines you get at your local store.**

thing to free computing power.

HARDWARE

Each shuttle flight normally carries one HP 41 per crew member. Two 41s can be loaded with one set of programs, and two with another set for additional backup. A card reader and a cassette tape drive are available in case the programs need to be reloaded.

Each 41 is equipped with a time module, an extended functions module, and two extended memory modules. If a card reader is needed, one of the extended memory modules is removed. The extended memory modules allow the total program capacity of the 41 to be doubled (one additional module) or tripled (two additional modules). Programs are stored in extended memory, then brought into main memory when needed for execution.

One special piece of 41 hardware was developed for NASA because the inside of a space shuttle is not as quiet as you might imagine. Cooling fans and other equipment can mask the relatively subdued tones of the 41's built-in beeper, so a louder beeper was needed.

Hart, with HP's cooperation, found the answer. A one-inch speaker was fitted inside an empty card reader case. A simple two-transistor amplifier was added to drive the speaker. The 41's port 4 connector was modified to provide the beeper drive signal on two of the pins, creating the loudest HP-41 ever heard.

This custom accessory aside, the 41s NASA uses are not special models. They're the same models you get at your local store. The only modification NASA makes is sticking Velcro strips all over the case so that the astronauts can attach the calculators to their flight suits. Non-skid feet are not much good in space.

The machine that pioneered alphanumeric display, keyboard customization and other advanced features continues to pioneer in space. If you're one of the million or more HP 41 owners, you're in good company. ☐

Keith Jarett is a satellite systems engineer and an HP 41 addict. He is the author of two books on synthetic programming.

SHUTTLE RADAR RENDEZVOUS PROGRAM

This program was used on Mission 41-C, the Solar Max repair mission, and on the preceding flight, STS-10, which tested the shuttle's radar-guided rendezvous capability. The program uses the time module's stopwatch functions to provide a quick estimate of the closing rate to a satellite being approached.

Astronauts periodically key in the current target range (in feet) and press an assigned key to execute the RDOT program (r-dot is the time-derivative of the range r). The program then estimates the closing rate, based on the last two range entries and the time they were entered. For example, the display

```
9543. -204.1
```

indicates a range of 9543 feet and a range rate of 204.1 feet per second (closing). The negative sign means that the range is decreasing.

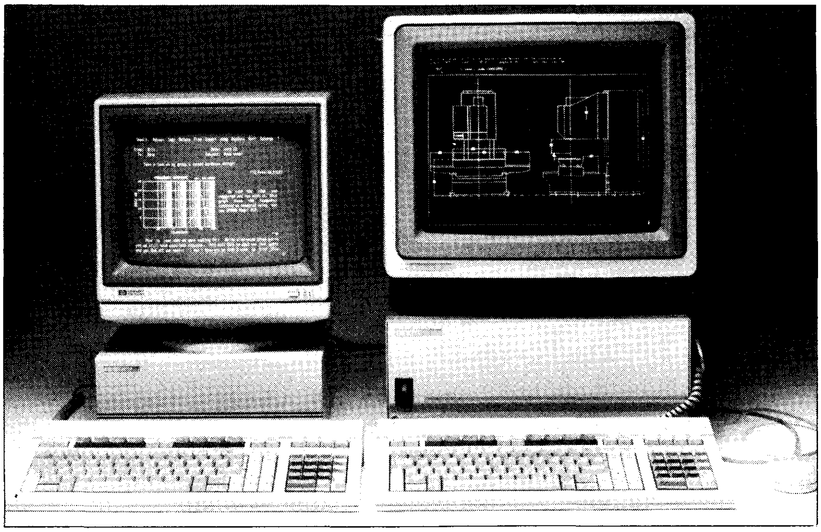
If the astronaut presses R/S without entering a current range value, the LBL 01 (Label 1) portion of the program estimates the current range based on the last two entries. The estimate will be reasonably accurate if no thrusters have been fired since the first of the last two range entries was made.

```
01♦LBL "RDOT"
 02 DEG
 03 STO 01
 04 STOPSW
 05 RCLSW
 06 STO 02
 07 0
 08 SETSW
 09 RUNSW
 10 FC? 15
 11 GTO 00
 12 RCL 02
 13 FRC
 14 100
 15 *
 16 ENTER↑
 17 INT
 18 60
 19 *
 20 X<>Y
 21 FRC
 22 100
 23 *
 24 +
 25 STO 02
 26 RCL 01
 27 RCL 00
 28 -
 29 RCL 02
 30 /
 31 STO 02

32♦LBL 00
 33 CLA
 34 FIX 0
 35 ARCL 01
 36 FC? 15
 37 GTO 00
 38 "⊢ "
 39 FIX 1
 40 ARCL 02

41♦LBL 00
 42 RCL 01
 43 STO 00
 44 SF 15
 45 PROMPT

46♦LBL 01
 47 RCLSW
 48 FRC
 49 100
 50 *
 51 ENTER↑
 52 INT
 53 60
 54 *
 55 X<>Y
 56 FRC
 57 100
 58 *
 59 +
 60 RCL 02
 61 *
 62 RCL 01
 63 +
 64 CLA
 65 FIX 0
 66 ARCL X
 67 "⊢ "
 68 FIX 1
 69 ARCL 02
 70 PROMPT
 71 GTO 01
 72 END
```



Series 200 models, options, enhancements from HP

HP has added two models to its 9000 Series 200 line of Motorola chip-based computers. The new machines are the Model 217 and Model 237. The line now consists of 14 workstations ranging in price from about $5,000 to $100,000.

Basic and Pascal operating systems, as well as HP-UX, derived from the Unix operating system, provide a growth path across the entire line.

The $6,510 Model 217 engineering workstation is a modular computer based on the MC 68010 processor with memory management and eight-MHz clock. It features a 14-inch green phosphor monitor with 512 by 390 pixel resolution and 512k of RAM, which is expandable to 4M using a new 1M RAM board. The RAM board costs $4,180 per Mbyte. A mouse, offered for the first time by HP, is available as an option for $148.

The $14,500 Model 237 graphics workstation is based on the MC 6800 processor at 12.5 MHz with memory management and cache memory. It includes a 17-inch, no flicker monitor with 1,024 by 768 pixel bit-mapped display and 512k of RAM, which is expandable to 7M using the 1M RAM board. The new mouse is standard.

For these models, as well as for all models in the 200 line, HP introduced what it calls its "most-asked-for features and performance enhancements," including:

- a new floating-point math processor that provides up to three-fold improvement in performance. It is claimed that this is especially useful when using the new seven-channel, 55,000-samples-per-second A-to-D card for data acquisition applications. The math processor is priced at $975, and the A-to-D card is $990.
- New (Rev. 3.0) Basic and Pascal operating environments, which offer up to 50 percent performance improvement over previous versions, according to HP.

The systems support the ThinkJet printer and HP 9122D double-sided 3.5-inch dual disk drive, which provides up to 630k of formatted mass storage per disk. Rev. 3.0 Basic and Pascal operating environments are $860 and $995 respectively. The 9122D disk drive is $1,270.

HP, 1820 Embarcadero Rd.,
Palo Alto, CA 94303.

Circle #100 on reader service card

Six against static electricity

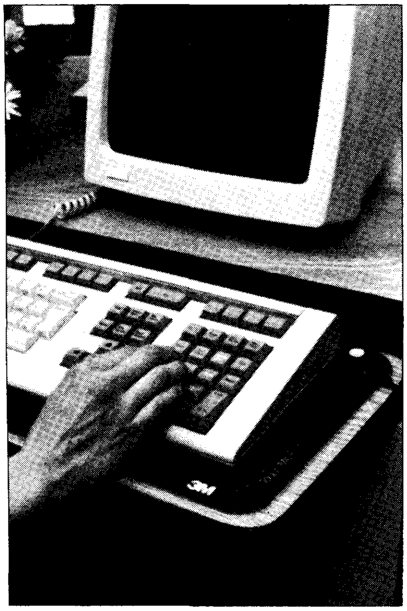
The Take Charge Static Strip, mounted on the space bar of a keyboard, enables what the manufacturer, Watts Out, Inc., calls a continuity of touch that virtually ensures effective and constant dissipation of static electricity.

The computer user touches the Static Strip before touching the computer or terminal and static electricity is drained away harmlessly. Normal use of the keyboard continuously engages the $14.95 anti-static strip and subsequent accumulations of static electricity are grounded automatically.

The manufacturer guarantees the product to dissipate up to 30,000 volts of static charge with each touch in less than .3 of a second with no static sensation of any kind.

The same manufacturer offers the Static Shield, which also carries away potential harmful static electricity. Larger than the Static Strip, the Static Shield adheres to a desk and costs $26.95.

The Static Mat, available from the same manufacturer, covers practically the entire desktop. When touched, it also carries away poten-



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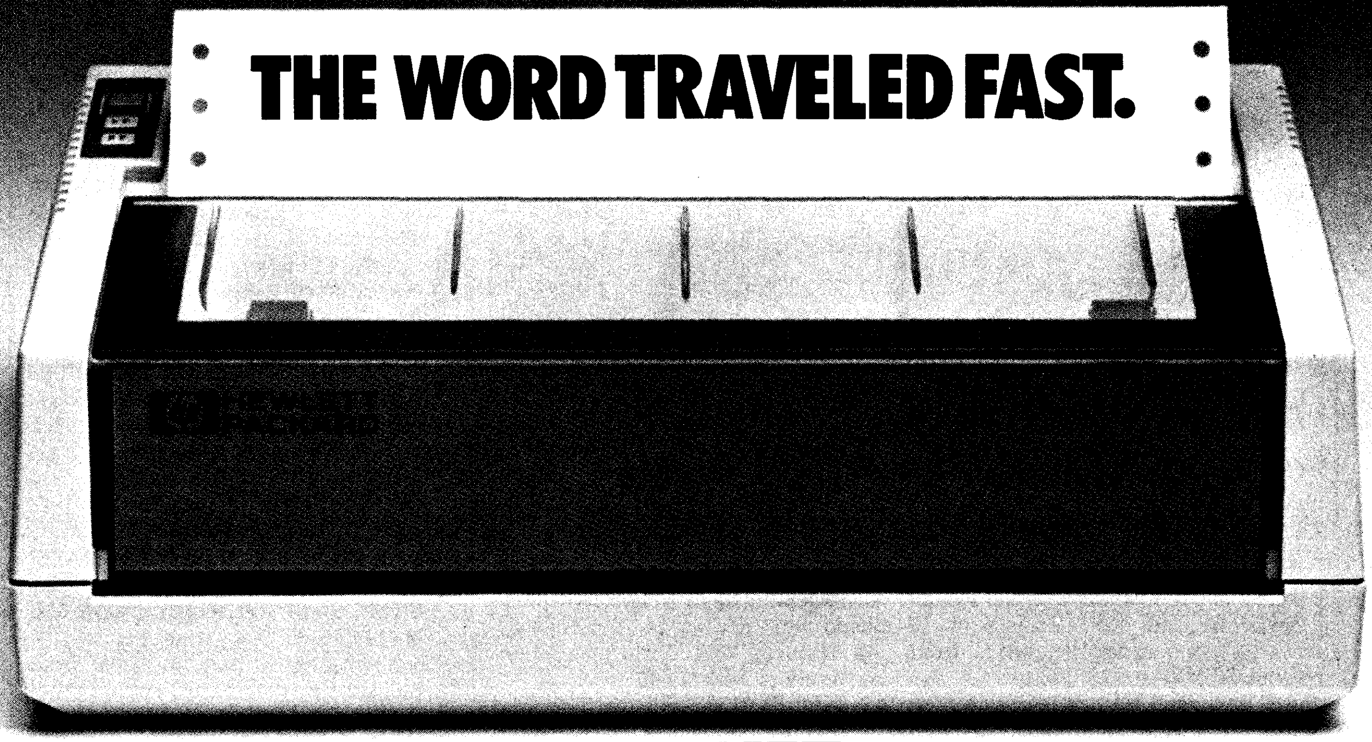

THINKJET.

Hewlett-Packard research has used inkjet technology to make the ThinkJet personal computer printer surprisingly quiet while printing 150 high quality, dot-matrix characters per second for text or graphics. The ThinkJet printer weighs only 6½ pounds and it takes up just a bit more room than your telephone. So, it can work right on your desk. There's even a battery-powered model that lets you print anywhere. And, the ThinkJet printer's ink supply and printhead are designed in one neat disposable unit that simply clicks out when it's time to change.

The ThinkJet printer will work with most popular personal computers, including Hewlett-Packard, IBM,® COMPAQ,™ TI,® or Apple IIe.®

Finally, as quiet, fast and compact as the ThinkJet printer is, it still has one more feature that's going to cause a commotion; its price... $495.00.*

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tially harmful static electricity. It costs $59.95.

Sentinel Computer Products' CXP Static Controlmat, placed under a computer user's chair or on the desk under the equipment, will instantly absorb static charges, negating all potential damage, according to its manufacturer.

These mats are made of cross-linked polyethylene foam, an inherently permanent conductor. Conductivity is below 10^5 ohm-cm and is not dependent on humidity. The table mat need only be touched to provide back-up conductivity in case a person is wearing shoes with non-conductive soles, such as crepe or rubber.

The floor mats come in a standard size, 39 by 39 inches, and cost $42 each. Volume discounts are available. They also come as 12-by-12-inch interlocking tiles, allowing any size and shape mat.

Both mats come in one-eighth-inch and one quarter-inch thicknesses and are equipped with a ground cord with snap connector on the mat plus a 1 megohm resistor.

3M's Static Control Systems Division also has an anti-static mat called the First Touch Model 9210.

Designed primarily for movable keyboards and step-down sections of computer desks and tables, the 9.5-inch by 23.5-inch Model 9210 pad drains away potentially harmful static charge.

The $39.95 pad's three-in-one construction includes a semi-conductive vinyl overlay and a high-conductive "scrim" intermediate layer attached to a non-skid, noise-reducing foam backing. It drains static charge from operator to ground via a snap-on grounding cord.

The pad's vinyl surface resists stains and can be cleaned with warm water and soap.

Watts Out Inc., Cherry Tower,
950 South Cherry St., Suite 920,
Denver, CO 80222.
Sentinel Computer Products, Division of Packaging Industries Group Inc.,
Hyannis, MA 02601.
3M, P.O. Box 33600,
St. Paul, MN 55133.

Circle #101 on reader service card

Buffer/spooler with HP interface

The GpiBuf buffer/spooler consists of GP-IB/HP-IB interface hardware (dedicated bus transceivers and a protocol controller), a group of band-switched RAM chips and a CPU/ROM that runs its operation. Additional circuitry provides power and controls memory refresh, which prevents loss of data.

The $995 device has 230k of usable RAM, enough to store about 70 pages of text. The GpiBuf accepts data from a computer at about 10k byte/s and sends it out at any rate up to that speed.

The buffer/spooler provides storage RAM to which the computer can dump output data rapidly, freeing the computer to get on with other things. The buffer/spooler in turn sends the data to the printer at whatever rate the printer can accept it.

The GpiBuf is compatible with all HP units supporting the HP-IB interface bus, including Series 80, Series 200 and HP 9825, 35 and 45.

The 230k RAM can also be used as a general purpose external memory. Used in this way, claims the manufacturer, the buffer/spooler more than doubles the memory of a number of HP machines, including the 85, 86, 87, 9825 and 35 and 9845A, B and S.

In general, buffer/spoolers increase operating efficiency by detouring output data into an electronic holding tank. This explanation is based on the axiom that electronic processes operate much faster than the swiftest printer. In a typical computer-to-printer configuration, the printer is fed data by the computer, which must then wait for the printer to complete its printout. Meanwhile the computer is tied up. Information the computer could send in a few seconds can take as much as an hour to print. This is not an efficient use of the computer's time.

A buffer can also supply data to a plotter. But the computer sends its command stream to the buffer much faster than the plotter can respond to it. If the computer were to wait for the plotter to execute a command and report back before moving on to the next command, the buffer's purpose would be defeated.

The key to using the GpiBuf with a plotter is to send explicit commands in HP-GL or to test your language thoroughly to make sure the statements are free of report-back

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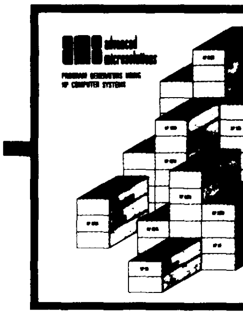

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Circle #160 on reader service card

traps. Although the most common use for the GpiBuf is as a printer buffer/spooler, other applications are possible because the unit can be commanded to talk and listen by the computer, just like any other bus device.

In printer-buffer applications, the GpiBuf accepts rapid output from the computer, then passes it on. The reverse is also possible. As a data logger, the GpiBuf accepts intermittent data from another device on the bus—for example, a device that generates a data point every 10 seconds. While the GpiBuf slowly accumulates this data, the computer is free to do other things. When convenient, the GpiBuf can dump the stored data into the computer. Or, with a brief instruction from the computer, the GpiBuf can send the accumulated data directly to a printer.

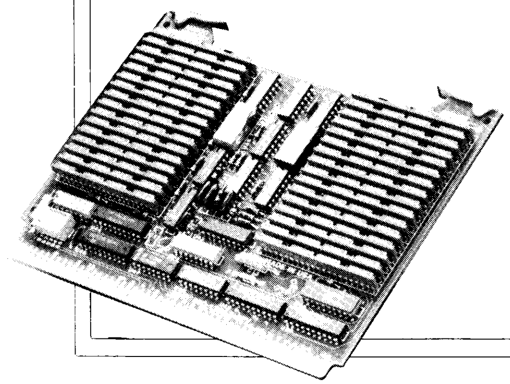
Eventide, Inc., One Alsan Way,
Little Ferry, NJ 07643.
Circle #102 on reader service card

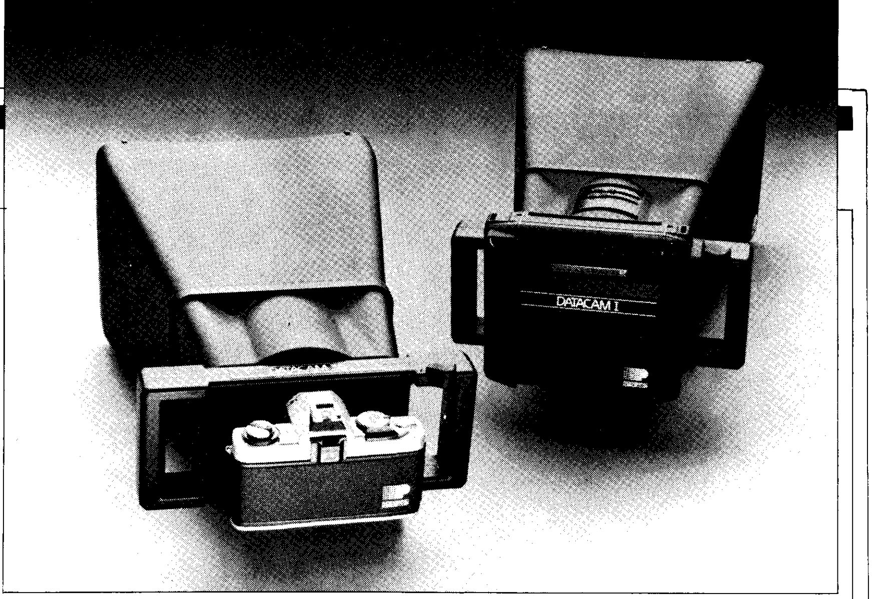
Megabyte board for Series 200

The AM200 is a 1M memory board for Series 200 computers, including models 9816, 9826, 9836 and 9920. The board is completely interchangeable with those machines' original memory boards and can be used to augment or replace the original 256k memory cards, claims the manufacturer. Installation is simple because the $2,950 board fits into any available I/O slot.

Up to seven memory boards can be installed in the 9826, 9836 and 9920. Two AM200 boards can be added to the 9816 and still allow you to use peripherals without the added expense of an I/O expander.

Infotek Systems, 1400 N. Baxter St.,
Anaheim, CA 92806.
Circle #103 on reader service card





The hard image

Datacam 1 and Datacam 35 are color graphic recording cameras that can reproduce images directly from a CRT screen.

Preassembled and easy to use, the Datacams can be held up to any CRT monitor, according to the manufacturer, and are activated by a special shutter release built into the housing. Both models provide clear photo reproductions without glare or curvature.

Datacam comes in two sizes, for 12-inch/13-inch screens and 19-inch/21-inch screens. A nine-inch model is planned.

Datacam 35 operates with any 35mm film, producing color or b/w prints and slides. Instant color slides can be made with Polachrome 35mm film and Polaroid's AutoProcessor (both available from the manufacturer.)

Datacam 1 produces instant 3 by 4 color prints using Polaroid Instant Color Film. Prices range from $545 to $925 depending on the model you buy.

Screen shots in this issue were taken with Datacam 35.

Photographic Sciences Corp.,
770 Basket Rd., P.O. Box 338,
Webster, NY 14580.
Circle #104 on reader service card

5.25-inch drive for 41 and 70 Series

Two 5.25-inch disk drives, designed to work with the HP-IL interface, provide mass storage for HP 41 and HP 70 Series handheld computers. The manufacturer claims that, since the HP 41 can, for most purposes, use only 131k per drive, its dual drive effectively offers about twice that memory.

The 368k single-drive model SB10161 uses dual-sided disks. The dual-drive SB10162 offers 736k of storage and inter-drive copying in the same physical package as its single-drive counterpart. Both drives store data in the format used in IBM's PC.

The single-drive model is priced at $625, and the dual-drive model at $895. Single-drive owners can upgrade to the dual-drive for $295.

Both drives are 3.5 inches high by 11.5 inches wide by 10.5 inches deep—dimensions that accommodate stacking an HP ThinkJet printer.

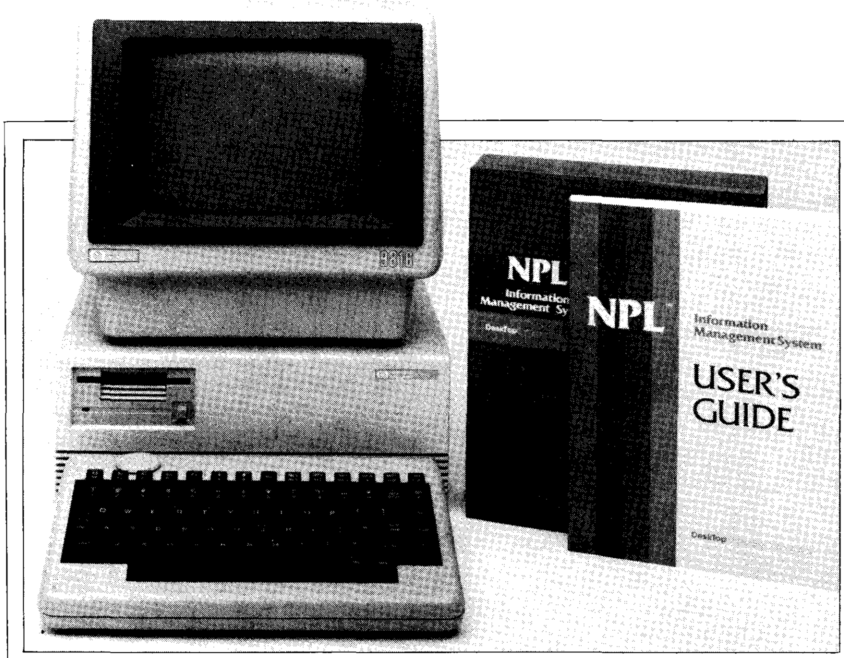
According to the manufacturer, the drives provide mass storage features not previously found on HP-IL devices, including:

- high speed data storage and retrieval;
- long media life;
- inter-drive copying (with SB10162);
- AC powered (no batteries);
- standard 5.25-inch media;
- physical write protection on disks;
- large storage capacity;
- IBM PC (40-track/side, 9-sector/track) format.

Ideal for data base and archival use, according to manufacturer, the high speed of the drives and the long life of the 5.25-inch media enables users to do what was previously impossible on the HP handhelds. Just loading a key-indexed data base would have worn out a tape.

The manufacturer plans to introduce programs that translate HP's text and data files into *dBase II* and *Lotus 1-2-3*-compatible form by the end of the year. And the files will be directly readable by an IBM PC.

Steinmetz & Brown, Ltd.,
2675 University Ave., Suite 202,
St. Paul, MN 55411. □
Circle #105 on reader service card



In the 200 users' terms

NPL, *the NonProgrammer's Language,* is, according to its manufacturer, an information management system for developing complete data base management applications without conventional programming. Modeled after fourth-generation language commands, *NPL* "programs" look like English sentences.

NPL, which runs on HP 216 and 236 computers, costs $950 for a customer who owns a full Pascal operating system. Users without full Pascal need the run-time version of *NPL* (including editor and filer), which costs $990. Any user also needs minimum 512k RAM and one disk drive, either 3.5- or 5.25-inch. A compatible printer is recommended.

NPL allows you to:

- prepare tabular reports;
- create summary and extract files;
- select information based on data items;
- design data entry screens with automatic validation tests on values, ranges and data types;
- do mathematical calculations and string manipulations;
- index data fields or defined functions for access and sorting;
- share information between your computer and a timesharing network;
- exchange files among computers.

DeskTop Software Corp.,
228 Alexander St.,
CN-5287, Princeton, NJ 08540.

Circle #106 on reader service card

Touchscreen-to-mainframe

Cleo for the Touchscreen Personal Computer loads from the MS-DOS disk and provides emulation for IBM's 3276/2 bisynchronous protocol and support for two devices, an IBM 3278 crt and IBM 3287 printer. It costs $500.

Cleo supports all standard features of the 3276/2, claims the manufacturer, and you won't have to make any modifications to your 3270 host computers. Installation on the Touchscreen is identical to installation on a 3276/2.

Cleo comes on one disk and takes up 128k RAM. Connection requires one synchronous modem. An IBM cluster controller is not required.

Cleo Software,
A Division of Phone 1, Inc.,
461 North Mulford Rd.,
Rockford IL 61107.

Circle #107 on reader service card

Six utilities for 86/87

Included in this series of six utility programs for the HP 86/87 are three for programmers to improve their ability to develop, edit and document their programs, and three of general applicability.

File Move'r is a complete disk management utility, according to its manufacturer. Its menu-driven functions make it easy to transfer files at twice the normal speed, either one at a time or in so-called wild-card groups. Five other file commands include UN-PURGE. It is designed for single or multiple disk drive configurations and is intended for files created under HP's normal disk system. It costs $139.95 and requires 64k.

Master Copy, a $129.95 disk duplication utility, includes a fast initialization option to format a blank disk in 30 seconds. Duplication, claims the manufacturer, is nearly three times faster than normal copy speed. Selecting the straight-copy option also generates a copy of all unused portions of the original volume. It is designed for single or multiple disk drive systems.

Q.Ed. Quick Editor is a productivity booster for program development. According to the manufacturer, single-key commands make it easy to skip around a program to add, change or delete selected code. This $149.95 program also allows composing a program line from various parts of the screen. Commands can help find and optionally change or delete a specific string or portion of a string throughout a program. Other commands offer a fast two-column catalog display and single-key toggling among disk drives.

Frun Util is a binary program with keywords for use in Basic programs. At $99.95, it provides versatile commands to control the screen and keyboard, according to the manufacturer, and includes a GET-CHARACTER command that can lock up the keyboard. Programmer access to the disk directory is also provided. MID$.

RSET and other string functions permit flexible and efficient programming. The users manual explains each keyword and provides sample program segments.

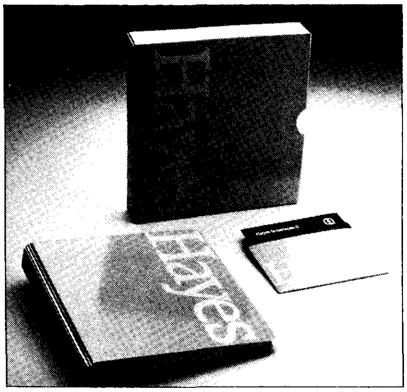
Screen Dump'r is a binary program designed to diminish the effort required to document a software system. This $99.95 program reproduces the text-screen on paper to accompany a narrative describing what a program is doing or expects a user to do at any given moment.

Super Snoop'r, an educational disk utility, reads and displays any sector of a standard disk volume. It also performs as a disk-zap utility by allowing the sector to be changed and written back to the disk. The $139.95 program's search function can scan all or parts of a disk volume and make optional replacements.

D & E Systems,
11440 Beechgrove Lane,
Rockville, MD 20854.

Circle #108 on reader service card

Fingertip communications upgrade



Smartcom II 2.0, an upgrade of Hayes Microcomputer Products' Smartcom telecommunications software, includes the Xmodem protocol, VT52 and VT102/100 terminal emulation and batch commands for automatic data transmission at specified times.

The $149 upgrade, running on the Touchscreen Personal Computer with a single disk drive, requires 128k of available memory, a Smartmodem (300 or 1,200 bit/s) and a cable to link the computer and the modem. However, only the eight function keys can be activated via the touchscreen.

The upgrade, claims the manufacturer, also protects passwords, tests the modem without going online and lets users switch from voice to data transmission during one phone call.

The program's Xmodem protocol (in addition to Hayes' Verification Protocol) ensures error-free transmission, and allows users to communicate with many bulletin boards nationwide, as well as with other software packages supporting this public domain protocol, according to the manufacturer.

The program's Batch Command Set directory stores up to 26 command sequences that automatically perform any Smartcom function, including logging on and sending and receiving files at preset times. For example, according to Hayes, a user can set up the program during the day to access Dow Jones News/Retrieval after midnight, when telephone rates are lowest. Or the user can "chain" several batch sets to sequentially access several computers to leave or retrieve messages. This feature also allows users to program the computer to sign onto a remote system as soon as it boots up.

The VT52 and VT102/100 emulation allows full-screen activity when accessing mainframes.

The program also lets users switch back and forth between voice and data transmission, allowing data transfer and confirmed transmission during the same phone call. Both the sender and receiver must have a Smartmodem and *Smartcom II 2.0.*

Other features include macro security, which protects passwords, account numbers and other personal information from unauthorized disclosure.

The upgrade includes all the features of the original *Smartcom II,* which can be upgraded to the latest version. Those features include ability to store communication parameters—data transfer rate, duplex, password, etc.—and log-on procedures for up to 25 remote systems. Both programs come with the log-on procedures necessary to access The Source, CompuServe, et al.

Hayes Microcomputer Products Inc.,
5923 Peachtree Industrial Blvd.,
Norcross, GA 30092.

Circle #109 on reader service card

Touch the bookkeeper

TAJ (The Accounts Journal), comprised of *Accounting, Job Costing* and *Forms Pac* programs, originally written for HP's Series 80, now runs on the Touchscreen and makes use of that machine's touchscreen capability.

The *Accounting Pac* includes accounts receivable, accounts payable, payroll and general ledger. The *Job Costing Pac* tracks revenues and costs and labor time for individual jobs, and can integrate with the *Accounting Pac* or operate as a separate system. The *Forms Pac* produces invoices, statements, payroll checks, accounts payable checks and W-2 forms.

Touch on TAJ can activate program execution, on-screen movement of data from one field to another, and answer questions asked by the program.

Accounting Pac, which costs $850, also includes multiple entry posting with "amount re-edit," which verifies multiple transaction entries at the time they are posted, and automatic tracking of IRS 1099 payments to vendors, a procedure the IRS began enforcing with 1983 tax returns.

The program helps a business that has more than just general ledger or accounts-receivable needs. As each transaction is posted, the general ledger and all appropriate subledgers (such as the customer subledger) are updated simultaneously. Therefore, claims the manufacturer, general ledger, accounts receivable, accounts payable and payroll are always in balance and updated with the correct figures.

The $425 *Job Costing Pac,* which operates without being integrated into the *Accounting Pac,* tracks all labor, material and "other" costs (such as machine time) for each job. Also tracked are billings, which are compared to amounts collected on job performance reports. The program also includes complete revenue, cost and labor hours, and budgeting for both the current month and the total job. Budgeted (expected) activity can readily be compared with actual activity budgeting.

The most commonly used procedure in the *Job Costing Pac,* according to the manufacturer, is allocation of labor time for various jobs. The POST PAYROLL command is used to instruct the program to post time sheets and/or job time. After labor time is allocated, the general ledger can be updated automatically.

The $250 *Forms Pac* uses the other two programs to produce quality business forms. Invoices show all charges to a customer for a given date, and the statements show a summary of all charges and credits for the entire billing period. Accounts payable checks can be generated for a specific date, such as the due date of a vendor invoice. Payroll checks itemize all deductions and earnings for both the current period and year to date, according to the manufacturer. *PDS Software, 2386 Fair Oaks Blvd., Suite 210, Sacramento, CA 95825.*

Circle #110 on reader service card

Ada for Series 200

A prevalidated version of the Defense Department's Ada programming language is available for HP Series 200 computers. The manufacturer, Solutions Plus, is now involved in the certification process.

An Ada compiler is priced at $7,500 per unit.

Ada, according to Solutions Plus, will become the "most supported, versatile, standardized language available." Originally designed for the military's mission-critical applications, it is also a general purpose language that the company feels "will surpass Fortran and Cobol."

The prevalidated Ada compiler, an implementation of the Telesoft Ada compiler, runs under the Renaissance operating system (ROS) and requires .5M of disk volume. ROS requires an additional 1M of disk volume and must be separate from the volume the compiler is on.

ROS allows input/output redirection, as well as pipes, script files, forking, multi-tasking (single user) and defining abbreviations. It also has a filer and screen-oriented editor very similar to those found in a UCSD workstation.

Solutions Plus claims that Ada on the Series 200 yields execution speed comparable to other languages of far less sophistication.

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Circle #163 on reader service card

TOOL-BOX

The TOOL-BOX disc has five utility programs for HP86/87 computers.

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Have you ever secured a program and then lost the password? The UNLOCK program can recover your password and unsecure those programs.

The READ DATA program can display or print any data file without requiring any knowledge of the file's data structure.

The CAT PRINT program prints up to three disc catalogs side-by-side on one sheet of paper and tells you how many bytes are already stored on the disc as well as how many storage bytes are still available.

The READ DISC program produces a display of the actual contents of any specified disc sector.

TOOL-BOX is available on 3.5" or 5.25" discs for $80.00, including a 25-page instruction manual.

ORDER FROM: Milton R. Beychok
63 Oak Tree Lane
Irvine, CA 92715
(714) 786-0837

Circle #164 on reader service card

tion, problem report listing and personal assistance as needed.

Solutions Plus' computer-aided instruction package ($1,250) is designed to train a high-level programmer to program in Ada. It is divided into two interrelated categories: quizzes and case studies. Complete documentation is also included.
Solutions Plus Inc. 2821 Remington, Fort Collins, CO 80525.

Circle #111 on reader service card

Three for laboratory data management

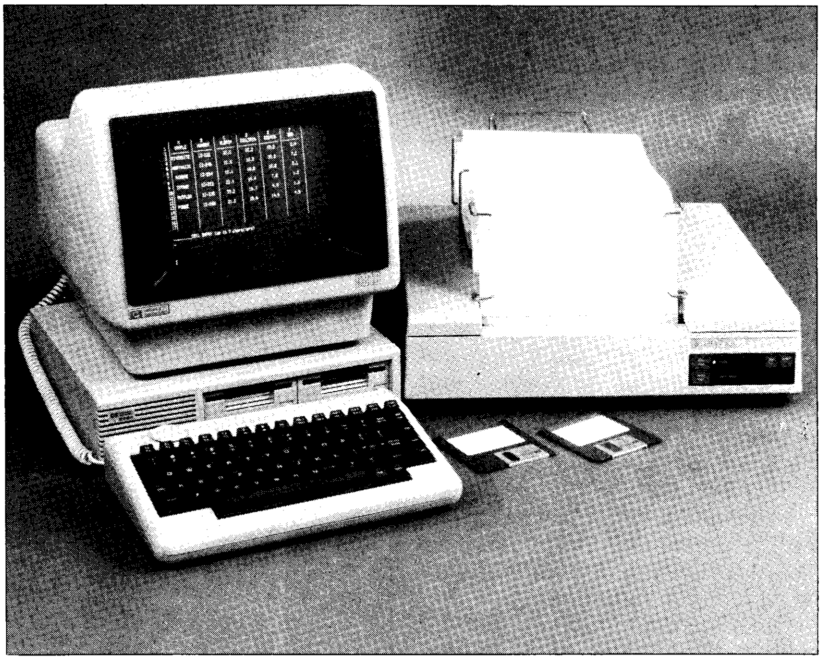
Three software packages for data base management in analytical labs are designed to complement one another, thereby allowing users to start with the basic package and build capability into their data base management system. The software is made for Nelson Analytical's Series 4400 multi-instrument data systems, which are based on HP's Series 200 desktop computers. The three packages are:

- *Gen Base 200* ($1,295) general purpose data base software for creating data bases. Using this program, data bases can be sorted, searched, modified and surveyed, reports can be constructed, mathematical calculations performed, and data bases merged and copied. A text editor provides word processing.
- *Lab Base 200* ($2,000) for analytical chemistry applications, allows automatic transfer and formatting of chromatography data from disk storage into a data base. The user can transfer data acquired on the 4400 using chromatography software into any specified format. *Lab Base,* claims its manufacturer, is the first analytic instrument software to offer automatic entry of chromatographic data, doing away with the need to transfer data manually.
- *Lab Star* ($3,100) includes capabilities from the first two programs plus sample tracking/status information, forming what the manufacturer calls a complete laboratory data management system. It also allows a user to obtain the status of sample flow at different measurement work stations throughout the lab.

The data fields in all three programs can be configured with access levels for security requirements and subroutines.

Interaction with these programs is via softkeys and screen menus so learning time is minimized. The programs are written as a turnkey system, according to the manufacturer, so that operators unfamiliar with programming can safely use the software.
Nelson Analytical Inc.
10061 Bubb Rd.,
Cupertino, CA 95014.

Circle #112 on reader service card



Security for authors and suppliers

DSEC87 is a security system for programs running on HP's 86 and 87 desktop computers. The manufacturer claims that *DSEC87* allows program authors and software suppliers using standard HP 5.25-inch disks to ship software to dealers and users with much more security than is possible via HP's SECURE command. *DSEC87,* which costs $1,500, prevents copies from running unless the original disk is mounted physically in the drive.

DSEC87 is a two-part system consisting of specially treated disks with an embedded identification key, or fingerprint. The system encrypts Basic and binary programs on these disks so that the programs can be CHAINed or LOADBINed only while the security system is in control of the machine. *DSEC87* prevents listing, tracing, merging and any other access to secured programs by any system routines.

Encryption is accomplished with a two-part fingerprint. One is unique to the owner of a *DSEC87* system; the second is unique to the particular disk sold to the user. No owner of a *DSEC87* system can access files encrypted by another *DSEC87* owner, and no user can access files sold to another user. Disks can be authenticated if they must be returned for updates.

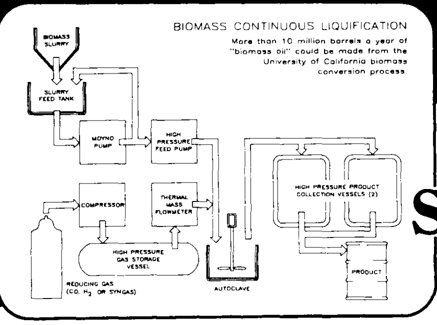
DSEC87 supports all statements and commands provided by the Advanced Programming ROM.

DSEC87 can encrypt programs only on disks that are specially coded with the software supplier's key and the user's key. Since these disks cannot be created on Series 80 computers, *DSEC87's* manufacturer offers pre-initialized blank disks (at additional cost). Optional software that initializes blank disks requires an HP 9826/36.

The user may copy encrypted programs to any other disk, a Winchester, for example, but the only way to decrypt and run the programs is if the resident binary *DSEC87* is LOADBINed from the original disk.

Structured Software Systems, Inc.,
Box 1072, Irick Rd.,
Mount Holly, NJ 08060. □

Circle #113 on reader service card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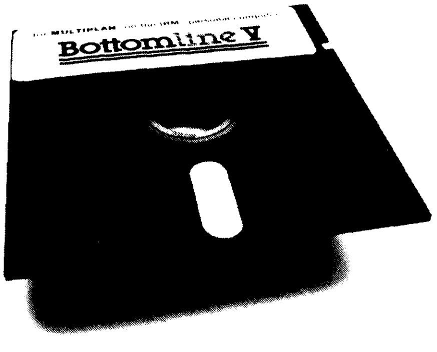

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NEW LITERATURE

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HP 150 User's Guide, written by Leslie S. Smith, is an introduction to the uses, capabilities and software availability for HP's Touchscreen PC. The 256-page manual is fully illustrated and offers instruction in the fundamental operation of the 150, as well as discussions on *MemoMaker* and *WordStar.* Published by Howard W. Sams & Co., 4300 W. 62nd St., Indianapolis, IN 46268. The guide sells for $15.95.

PUBLIC DOMAIN SOFTWARE

How to Get Free Software, written and researched by Alfred Glossbrenner, is a comprehensive guide to accessing computer software available in the public domain. Glossbrenner's manual tells the reader what software is available, as well as how to tap into data libraries that offer literally thousands of useful public domain programs. Published by St. Martin's Press, 175 Fifth Ave., New York, NY 10010. The book is available for $14.95.

EASY ACCESS ON-LINE

The Microcomputer Users Guide to Information On-Line, by Carol Hansen, is a reference guide that includes data base costs and descriptions of subject matter available on-line, as well as the vendors who supply that information. The guide also gives instruction in performing searches and downloading programs. Published by Hayden Book Company, 10 Mulholland Dr., Hasbrouck Heights, NJ 07604. The 240-page book is available for $18.95.

SOFTWARE DOCUMENTATION

How to Document Your Software, written by Barbara Spear, is a tutorial that gives step-by-step instruction in the documentation of software for commercial publication. Published by Tab Books, Blue Ridge Summit, PA 17214, the guide is available for $19.95 hardbound and $12.95 in paperback.

UNDERSTANDING LOTUS

Also from Tab Books comes **Lotus 1-2-3 Simplified.** Written by David Bolocan, this guide is designed to aid readers of varying expertise in understanding *Lotus 1-2-3* business software. Using examples as a guide, the author moves from installation to creating programs and designing and using spreadsheets. The book is priced at $16.95 hardbound, $9.95 paperback.

PROGRAMMING ON THE HP 41

HP 41 Synthetic Programming Made Easy, written by Keith Jarett, uses the newest synthetic programs and techniques along with cross references to other sources to make this complicated method of programming on the HP 41 more understandable. The spiral-bound guide also houses a plastic reference card for synthetic programming. Published by Synthetix, P.O. Box 113, Manhattan Beach, CA 90266. The guide is available for $16.95.

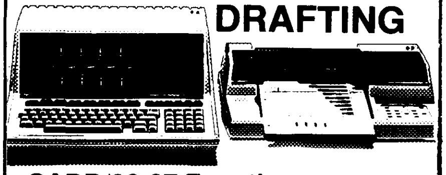
HP 41 Extended Functions Made Easy, also written by Keith Jarett, assumes no prior knowledge of extended memory, but takes the reader step-by-step from basic functions to examples of extended functions and their use. Also published by Synthetix, the guide is available for $16.95.

MORE HEWLETT-PACKARD NEWS

Hewlett-Packard Series 80 Software Catalog, 3/E, is published by Prentice-Hall, Inc., Englewood Cliffs, NJ 07632. The catalog sells for $12.95.

An Easy Course in Programming the HP 12C, by Chris Coffin and Ted Wadman, is a guide for programming the 12C and other HP calculators. Published by Grapevine Publications, Inc., P.O. 118, Corvallis, OR 97339. Available for $18 plus $2 shipping and handling.

An Easy Course in Programming the HP 41C, also from Ted Wadman and Chris Coffin, provides step-by-step instruction for programming. Published by Grapevine Publications, Inc., P.O. Box 118, Corvallis, OR 97339. Available for $18 plus $2 shipping and handling.



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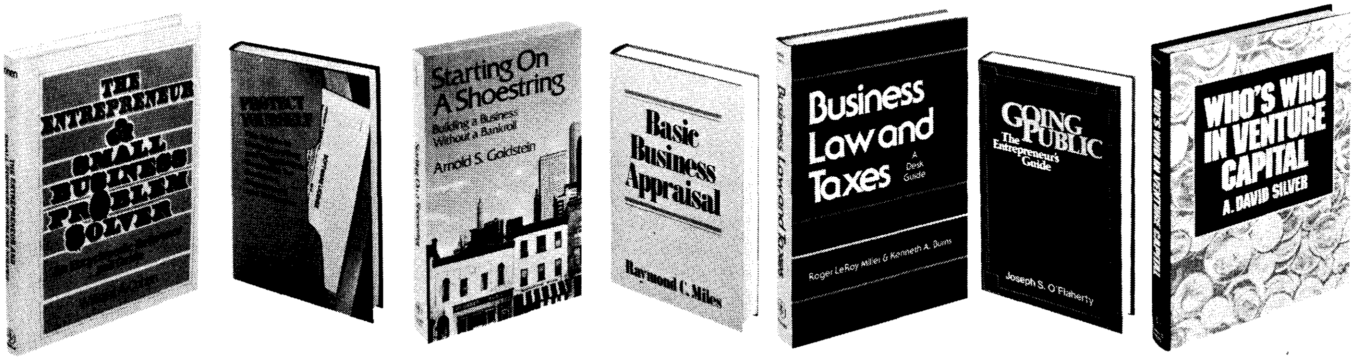

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Plotting for your birthday

BY MARTIN HANSON

A sure way to arouse a non-computer user's interest in computers or to provide an easy-to-understand introduction to computing is to combine personal characteristics such as birthdays, horoscopes and biorhythms with a computer application.

HP recognized this natural tie-in and, as part of some early system demos, distributed a Birthday Plot routine to demonstrate plotter capabilities.

On page 77 is a Series 40 version of one of these routines to amaze your friends and to discover whether a computer-generated plot based on a birthday can reveal personality traits.

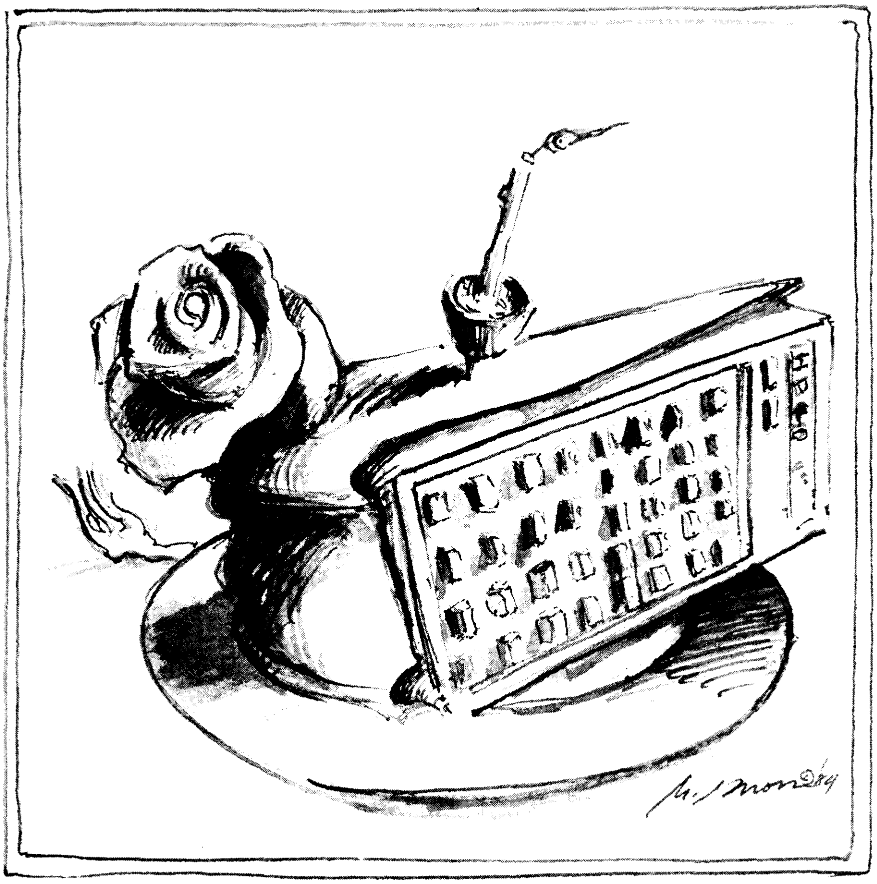
Before dismissing this program as just a showy trick, it may pay to look at the program for ideas on programming techniques. This may not be the optimum version, depending on what constraints you wish to apply, but some areas are worthy of mention.

The first is the random number generator (lines 35 to 41). This is the same routine that is used by HP in its programs in the Standard Application and Games modules. It generates a random number between 0 and 1 from a similar constrained seed. For this application the seed is, of course, a scaled number derived from a numerical birthday input.

A second area of interest is the routine to change pens. The basic technique illustrated here is nested loops. The pen change parameter must be either 1 or 2. This requires a function that oscillates between these two values. The SIN and ABS functions were used in combination to produce a function to meet this criteria (lines 90 to 96).

The program also exhibits several synthetic applications. The first is the short form exponent, as in lines 16, 23, 52 and 55. Notice the leading "1" is missing from the program listing for exponential numbers (EEX). An additional synthetic application is the use of the Alpha register for data registers. These appear as [, \, and] in the program listing and correspond to the M, N and O registers of the Alpha register. The principles of indirect addressing and loop counters are used in their pure form.

To use the program, a plotter ROM and HP 7470 graphics plotter are required. A minimum SIZE of 34 will handle all cases. The input to the "BIRTHDAY?" prompt is, MMDDYYYY.



REGRESSION ANALYSIS

Under the general heading of statistics is regression analysis—the study of a dependent variable and one or more independent variables. The result is a best-fit equation for the sample data that can be used to draw conclusions or predict future results.

The 41 is capable of storing relatively large amounts of data for a calculator, either internally, in extended memory, or in mass memory devices. This makes the 41 an ideal instrument for statistical applications.

New technology continues to lower the cost of data collection and storage while there is little educational emphasis on being able to interpret the data intelligently. Regression analysis is a study area that could be introduced at the high school or junior high level.

Existing programs on regression may be found in several places. The HP Users Library currently lists more than 50 programs on the subject for the 41. HP has produced the *Statistics Application Pac* and *Test Statistics Solution Book.* Each contains information and programs for the 41 on regression analysis. Regression and curve fit application programs have appeared in the *PPC Calculator Journal* several times. *PPC* developed a custom ROM module that contains some interesting and useful routines to analyze data. This ROM also contains some clever histogram plotting routines for either the 82143 or the 82162 thermal printers.

One of the inherent problems in using purchased software for any machine is adapting the program to your specific application. After all, unless it was a custom job, the programmer had little, if any, information on the format and/or type of data you need to process. Regression analysis programs

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will generally not have this problem because of the generic nature of the analysis; that is, to take sets of raw data and be able to draw some conclusion to predict some future event.

When evaluating a data analysis program, the specifics to look for are types of regression analyses, maximum number of data points, number of variables, system requirements and, of course, more than adequate documentation.

If you can't find exactly what you need, one or two statistical analysis textbooks should give you enough information and formulas to write your own personal versions. A good reference for regression analysis on programmable calculators is William Kolb's book, *Curve Fitting for Programmable Calculators,* from IMTEC, P.O. Box 1402, Bowie, MD 20716.

HP-IL DISK DRIVES

HP 41 users with mass storage requirements have been looking for a compatible disk drive since shortly after the introduction of the digital cassette drive. One of the features desired for a new mass storage device was a faster file search and access time.

Tape storage peripherals, which have a relatively slow file access time, have always preceded the development of disk storage peripherals, which have a much faster file access time. There should be at least two IL disk drives available by this time.

The first is from HP, which announced the HP 9114A 3.5-inch IL single disk drive ($795) for The Portable. Most of the information released on this peripheral has been related to The Portable, but compatibility with the HP 41 is mentioned. Average access time is listed as .497 seconds.

Peter Steinmetz of Steinmetz & Brown introduced a third party HP-IL disk drive at the June 2 PPC Conference in Chicago. The Series 10160 disk drives have a fast average seek time—preliminary information indicates .25 seconds while the drive is in use and 1.25 seconds from an idle state. As compared to HP's cassette drive average file access time of 13 seconds, the disk offers an enormous improvement in file function execution speeds.

Steinmetz chose the 5.25-inch disk due to its popularity and availability, rather than the 3.5-inch media HP chose. The 5.25-inch disk format is the IBM PC format of 512 bytes/sector, nine sectors/track, 80 tracks/disk, for a total of more than 368k per disk as compared to a total of 270k on a 3.5-inch disk (single-sided).

Not all of this storage is directly available using the 41 as the controller, however. The HP-IL for the 41 can only access 128k, like the cassette drive. A 41 with an extended I/O ROM and special program controls will access the remaining storage area of the disk. The Series 70 machines can access the entire disk without modification.

The disk drive can be addressed and treated exactly as a cassette drive without any additional HP-IL commands. For the dual drive unit, each drive can be treated similar to two unique cassette drives.

Marketing plans had the first shipments scheduled for mid-August. At the time of this writing, the drives are being tested for compliance with FCC regulations. Final prices had not been set, but were estimated at $600 for the single drive and $900 for the dual drives. The case for both units is the same and an upgrade from single to dual will be offered. For information write: Steinmetz & Brown Ltd., 2675 University Ave., Suite 202, St. Paul, MN 55114, (612) 646-2478.

EPROM APPLICATION

Jake Schwartz of Collingswood, NJ presented his work on an order processing application program at the recent PPC Conference in Chicago. The programs were written for salespeople at Quaker Oats.

Basically, the idea was for salespeople without any programming knowledge of the 41 to enter and record supermarket orders. The task was complicated by the addition of error trapping routines to prevent illegal data entries and was further complicated when the shipping orders also were to be processed by the 41.

No shipping vehicle, of which there were several types, would be sent until filled to a minimum capacity. Each shipping vehicle had a maximum capacity as well. The capacities of the shipping vehicles had to be checked for both volume and weight limitations.

Much of the final program code was done in Mcode to increase execution speed. The 41 was SIZEd at 319 for data manipulation and the program code and item data base resided on EPROM chips.

Additional features of the program were order reviews, item additions and deletions to the data base, and menu options for user friendliness.

Development time for the entire application was 600-plus hours. ☐

Wanted: Software writers for the 71

BY ROBERT BARKAN

If you're a professional software writer looking for a new market, HP is looking for you. HP will pay a 50 percent royalty on HP 71 software packages that it accepts for sale through its new Software Distribution Center (SDC) run by the Users Library in HP's Corvallis, OR facility.

HP also will include summaries of accepted programs in a software catalog to be included with each 71.

The SDC will duplicate the software for customers on whatever medium you provide—magnetic cards, minicassettes or 3.5-inch disks. You also must provide the documentation. If you supply quantities of the manual, the SDC will inventory and distribute them; if you supply just a master copy, the SDC will distribute photocopies of that.

To qualify for acceptance by HP, a software package must be one that, "has a special or unique application; is reliable; has been rigorously tested; is functional or entertaining; is user-friendly; is versatile."

But, before you whip out your 71 and start programming, be warned that, although a flyer publicizing the SDC will be included with every 71B sold, HP will be very choosy about the software it accepts for SDC distribution.

HP's objective is to stimulate the creation of a sizable array of software in order to make the purchase of the 71 more attractive to potential buyers, particularly those in the many narrow and specialized markets in which the power of the 71 can be exploited uniquely and fully.

Therefore, HP will accept for the SDC only software packages that contain first-rate, professionally developed software and documentation.

REFERENCES REQUIRED

HP has established stringent selection criteria for this third-party software program. Prospective participants will be asked to furnish, for example, a market plan for the proposed software: who the product is targeted for, when it will be available, how many they expect to sell, etc.

And to ensure high quality in the software itself, HP will ask for, "evidence of comprehensive testing through six user references."

Since HP will require developers to provide support for accepted programs, the company will want to see evidence that the developer has sufficient professional experience and works under professional business practices. Therefore, in addition to scrutinizing the product, HP will ask prospective participants for information about their businesses; what other products they have worked on, etc.

For those who make the grade, HP will offer a 40 percent discount on "one customized HP 71 system" for use in developing the software. This system could include HP products not specific to the 71, if such products were required for the proposed application, such as data transfer between a 71 and an 87.

HP has made it relatively easy and inexpensive to develop software for the 71. You won't need a VAX or an HP 3000. You could write code using just a 71, but HP is providing software that will enable you to write a program as a text file on another microcomputer, such as an IBM PC or a Series 80 computer, then transfer it to the 71.

Additional software enables you to use the keyboard and display of the other computer so that you can write and debug programs for the 71 without transferring files, just as if the 71 had a large keyboard and large display.

The basic system you'll require for developing software for the 71 using a host computer consists of the following (prices shown are before the 40 percent discount):

- 82401A HP-IL Interface, $125. This plug-in is required for connecting the 71 to the host computer. It also contains the DISPLAY IS statement, which enables you to send output to the CRT of the host computer instead of to the LCD display of the 71.
- 82164A RS-232C Interface, $295, or 82169A HP-IL/HP-IB Interface, $395,

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110 and 150

depending on which computer you use as a host.

- 82441A Forth/Assembler Pac, $150. This plug-in contains a Forth operating system, an assembler, a text editor and the KEYBOARD IS statement, which enables you to use the keyboard of the host computer for controlling the 71. (For a discussion of the advantages of Forth for writing application programs, see "HP 71B: A Fistful of Power" in the April/May issue of *Professional Computing.*)
- If you don't have a host computer with terminal emulation capability, you can nevertheless write HP 71 Basic programs as text files to the 71 for execution. To transfer files you'll need the 82440A Software Development Utility—$35 with software on minicassettes, $40 with software on magnetic cards. To connect the computers, you will need the appropriate HP-IL interfaces listed above.

For more information about writing software for HP's Software Distribution Center, write to the center, c/o HP, at 1000 N.E. Circle Blvd., Corvallis, OR 97330.

CURRENT SOFTWARE

Here's a complete list of the software that HP expects to have available for the 71B by the time you read this:

- 82441A Forth/Assembler Pac ($150)
- 82480A Math Pac ($95)
- 82481A AC Steady State Circuit Analysis Pac ($75)
- 82482A Finance Pac ($75)
- 82483A Surveying Pac ($150)
- 82484A Curve Fitting Pac ($95)
- 82485A Text Editor Pac ($75)
- 00071-90064 Math Solutions Book ($12.50)
- 00071-90065 Games Solutions Book ($12.50)
- 00071-90066 General Utilities Solutions Book ($12.50)

The software packages called Pacs come ready-to-use in plug-in ROMs. The software packages called Solutions Books provide listings of the Basic programs for you to key into the 71's RAM, but you can also obtain the programs prerecorded on minicassettes or on magnetic cards from HP's Users Library in Corvallis.

The prerecorded minicassettes cost an additional $12; the magnetic cards cost an additional amount that had not been determined at the time of this writing, but which were expected to be priced higher than the cassettes. □

Using a chain saw on balsa wood

BY DON PERSON

I've lately been in touch with a number of Independent Software Vendors (ISVs) and have yet to meet any who didn't express concern over program piracy. Beyond the legal ramifications of piracy, this concern is understandable. Being a Series 80 ISV does not put one on the same road to riches that writing for IBM can, considering HP's comparatively minuscule Series 80 user base.

Then what is the motivation for writing for such an unprofitable market? Usually it's inner creativity, the need to fulfill what programmers see as their artistic sensibility, and the desire to simply do something useful.

Because of the small numbers involved, however, every sale counts, especially if an ISV expects to see any return on the effort expended just bringing a software product to market.

Which brings me to a program I recently received; a program that shall remain nameless for a number of reasons: it uses purloined code, is conceptually faulty and can damage disks even when directions are followed.

I mention it without naming it, however, because the program is designed to remove security without having the original password. The need for this is extremely questionable, to say the least, and arguments in its favor, advanced by the publisher, have failed to sway my opinion. And while the author is busy disavowing piracy, the essential security-cracking capability of the unsecure program turns out to be hot merchandise—lines of code lifted from an 87 demo disk program. The way that this turkey cracks security has all the finesse of making a balsa wood airplane with a chain saw.

'FREE' SOFTWARE?

I had an early introduction to commercial program piracy in the Series 80 universe. About two weeks after I'd gotten my first 87A, an acquaintance, employed by an established Massachusetts company, offered me some "free" software.

The "free" software turned out to be a bootleg copy of 87 *VisiCalc,* complete with a photocopied manual.

My acquaintance was proud to relate details of his company's standard practice. It buys one copy of a program, then duplicates it for internal distribution to the company's other divisions. At the time, the company had made more than 50 copies.

While this kind of misconduct is bad news for companies like HP and VisiCorp, it's disastrous for Series 80 ISVs.

There are real reasons for copy/list protection. As a designer of software interfaces for medical equipment, would you want the end user to tamper with the code? I wouldn't. As a programmer, would you like to protect unique algorithms from prying and possibly competitive eyes? Of course. Whether we discuss personal privacy in the workplace or trade secrets, there are more reasons to protect security than not to.

System security already is a nonissue for many assembly language programmers; I open up programs and I know others who can. But I won't sell the tools to do it. Would you trust a locksmith who sold master keys to anyone with the correct change? Recent history shows that there are plenty of people happy to rip off software artists. Why give those folks a hand? While there are native disk zapper programs on the market, I don't know of anyone who gives instructions on how to use them to burglarize software.

The maker of my software "chainsaw" would have us ignore these realities of life in favor of expedience and other personally profitable views.

If piracy is destined to help anyone, it is the makers of security extension programs. That brings us to Jerry Jensen and Structured Software Systems, Box 1072, Irick Rd., Mount Holly, NJ 08060. The programs are *Dsec87* and *Sec85* for the 86/7 and the 85 respectively.

For $1,500 you can secure completely your Series 80 software against unauthorized copying. Structured's se-

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curity methods are practically unbeatable; the demo disk has resisted my best efforts and those of some sharp people at the lab in Corvallis, too. Even disk image copies are ineffective. I spent more time than I care to think about trying to break in. The result? Accurate copies that don't work.

While their method relies on the use of specially prepared disks, media pricing isn't extravagant and the overhead that *Dsec* puts on your own code is easily handled.

I hate to see a situation in which a program producer must resort to scrambling and encoding his/her work to keep the bandits at bay, but that is what it has come to. Jerry's work is brilliant and is guaranteed to frustrate any would-be copier, no matter how well equipped. Someone with a lot of assembly language skill and an HP 9816 might be able to do it, but I wouldn't bet on the results.

87XM PRODUCTION EXTENDED

Here's some good news. 87XM production has been extended. After a cutoff date had been set, many would-be owners came forward with last minute orders.

In spite of claims to the contrary, I see the Series 80 as mature, not obsolete. Unique CPU and all, there is still nothing on the market that matches what the 85-87 can do as an IEEE-488 bus controller. At least not in the same price range. I have a 10-year-old model 21 calculator that shows no sign of quitting and I expect no less from my Series 80 gear.

TIP POTPOURRI

My correspondence indicates that program tips and techniques are in demand, so here's a potpourri of some favorites.

For programing: Create a dummy data file on your disk that is greater in size than you project the completed program to fill. Then purge the dummy and store your work. Your program will fill in the null that was left by the file purge and give you room to expand without leaving a directory full of increasingly large holes.

There are optional keywords in Series 80 Basic, but they can waste memory. LET is optional for variable assignment. A=1234.55 is preferred over LET A=1234.55. Another case is the implied GOTO. For instance:

```
100 IF A=45 THEN GOTO 200
```

conserves memory if written instead as:

```
100 IF A=45 THEN 200
```

This uses the implied GOTO for a code savings.

One of the most overlooked functions is POS ( ). It can be of help in ways you might never think of, particularly if you are making choices based on input. Let's say you wish to make a branching choice based on a single character input. Here is a failsafe method, using 87 example code:

```
100 ON POS( "YNER",UPC$(K$))+1 GOTO
BAD_KEY,100,200,ESCAPE,RESTART
```

K$ is the single input keystroke and the quoted string corresponds to choices in a prompt. The demonstration code requires no error trapping since any possible entry is covered, including a selection not on the recognized list.

For the blossoming assembly language programmer: When you need data storage within a binary program, it is accepted practice to save memory locations within the program using a labeled BSZ. Using it, however, requires extra steps—you must convert the relative address you assembled to an absolute address to store into.

A more compact method is to find system-defined addresses in RAM that you can take over for your own use. I've found a nice block of them that are used by the graphics ROM, but are available if you are not using combined graphics (86/7-ROM#1) calls. The graphics ROM uses 32 bytes of RAM for scratch pad calculations starting at octal 104462 and ending at 104521. I usually assign labels in my own source and carve out data and flags from this group.

Making double-spaced output on the 86/7: You have interface control registers in your computer that you can use to control printer line spacing. This will set double-spaced output. SET I/O 7,16,3 tells Interface 7, Register 16, that there are to be three bytes output for each completed print statement. SET I/O 7,19,10 places a linefeed character in the extra register we now use for printing.

To return to single spacing, use SET I/O 7,16,2. If you wanted triple spacing then SET I/O 7,16,4 and SET I/O 7,19,10 and SET I/O 7,20,10 is what you want. Clearing any multiple-spacing command requires only SET I/O 7,16,2 to return to normal.

A warning: When setting this multiple-spaced mode, do not write to a register higher than 23 or you will endanger disk control information, which I can assure you you don't wish to do. ☐

Thanks, Coach

BY SAM LIGHTMAN

In his book, *America Now: The Anthropology of a Changing Culture* (Simon and Schuster, 1981, New York), cultural anthropologist Marvin Harris investigates the origins of the ills that beset us, from vandalism and crime to the shrinking dollar and shoddy merchandise.

His first two chapters, called "Why Nothing Works" and "Why the Help Won't Help You," describe the decline of America's reputation for quality merchandise and the concomitant alienation of workers ever further removed from the results of their labor and the people affected by it.

Harris is particularly graphic in his description of the frustration and rage associated with attempts to gain satisfaction over the telephone from people who don't know you, will never meet you and couldn't care less about your problem.

Well, throw Harris away and come with me now to Silicon Valley, where the skies are not cloudy most times, the workers seem to like their jobs, dedication is rampant and even disembodied telephone voices seem to have a certain empathy. Harris wouldn't recognize this place as a part of the United States.

Nowhere have I encountered such universal dedication to quality and concern for the approbation of the customer as in this enclave of high tech.

The one company that embodies this attitude more than any other, which may have set the tone for Silicon Valley from the outset, is HP.

NOBODY SHRUGS

It sounds almost soppy when you say it, particularly in light of Harris' writings, but HP people really care about the products and the reception of them by the customer. For example, when I express my extreme displeasure with the HP 150 keyboard or my sense that this or that program leaves a lot to be desired, nobody ever shrugs. What they do is look downcast. They are genuinely sorry that you do not like the product in question, because they really want you to.

All of this is by way of introduction to the one service which demonstrates probably better than any other the level of genuine concern for customer satisfaction: HPCoach, HP's toll-free phone-support group (800-472-6224). Reread that bit about the frustration and rage associated with the quest for satisfaction by telephone and you begin to understand the challenge attached to the service provided by Coach.

"Support is like the medical profession," says Dave Iuppa, head coach, at the beginning of my last visit. "People call you when they have problems. It's always fulfilling when you can help them out."

HPCoach came on line about a year ago with the idea that customers with personal computers needed special help; a human being to talk to.

"Our objective is to get back to the customer with an answer in less than four hours," says Iuppa. "We're running consistently less than that."

10,000 CALLS A MONTH

Considering that Coach is fielding 10,000 calls a month, that's a pretty good show. Indeed, the latest survey shows that 85 percent of callers think Coach is doing well, very well or excellent, an excellent approval rate by any standard.

Coach has a team of about 70 staffers divided up into marketing associates, specialists and engineers. When a call comes in, it is taken by a marketing associate who passes it along to one of nine teams of specialists: spreadsheet, word processing, data base, data communications, accounting, graphics, peripherals, technical systems and business systems. The specialist either has the answer available or works in combination with an engineer or even the lab to come up with one—in less than four hours.

Marketing associates are hired on the basis of their communications skills rather than their technical backgrounds. "We have everything here from ex-secretaries to a Princeton grad with

a degree in cultural anthropology," notes Iuppa. "We're looking for people with high potential, because we want them to move up along a continually improving career path. We want to build the organization with these people."

As the MAs become more technically sophisticated, they move over to become specialists. The specialists are still not engineers except in those areas where it's really necessary, such as where programming languages come into play.

What happens to specialists after they've been in their positions for a while? Where do they go next? I had a particular interest. When I first bought my HP 150, I had a tough time getting superscripts and subscripts out of my Brother HR-15 daisywheel printer. A specialist I had come to call WordStar Kathy had pursued the problem tenaciously until she came up with an answer, for which I profusely thanked her and her team by letter. Did she get the letter and where was she now?

Iuppa burrowed into his desk and came up with a file from which he extracted my letter.

"Every supervisor has a stack of complimentary letters like this," he said. "We must have hundreds." And just then the heroine herself came by. Iuppa introduced me to Kathy Sulgit, only now she's Data Base Kathy.

"But I still have occasion to use my *WordStar* background," she said. "Just today someone was trying to set up a file on a data base that I recognized would be easier to do with *WordStar*. If I hadn't had the experience, I wouldn't have been able to make the best recommendation."

"The fact is," Iuppa adds, "nobody alive knows the products like the specialists. They're talking to people who are using them in ways we never thought of. The education is definitely a two-way street."

THE FEEDBACK FUNCTION

That leads to another point. An ancillary, but extremely important, function of HPCoach, in some respects as important as the customer interface mission, is the feedback it provides to the labs. Periodically, the call reports are assembled, the data stripped off, then sent to the lab or product management teams for review. The result is that Coach has a real impact on product development.

"We're right on the front line with the customers and we're also right in the product group," Iuppa says. "We're part of the support team that reviews each product. We go through the final documentation and we'll have considerable impact, if not the first time around, then the second.

"There has been considerable feeling that the lab people should have some contact with the customers. We're embarking on a new program now in which people from the labs will spend time at HPCoach actually working as engineers here. They'll work for two days and come back periodically for a one-day refresher."

At the wrap-up, Iuppa says, "I think people appreciate the fact that we genuinely care. And I think that's the hallmark of HP, the fact that we care and it comes through." And with that, he hands me a new applications note on the HP 150 as used to support the Brother HR-15, and we say goodbye.

Thanks, Coach. □

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Major announcement of major additions

BY RICHARD FACTOR

The big news last column was the impending announcement of two new computers—the 217 and the 237—and of the long-awaited Basic 3.0. I trust your appetite was whetted for more information.

The 217 exists: There's one sitting on my dining room table. Basic 3.0 exists: I've loaded it, all 587k, into the 217's capacious memory. The 237 also exists, at least according to photographic evidence supplied by HP, which I have no reason to doubt.

Other new items in HP's current announcement include the latest Pascal version, 3.0, a mouse, a megabyte memory card, an arithmetic co-processor and several mass storage devices.

All the above, coming at the same time, rate as a major announcement. I'll cram in as much information as I can and risk missing the trees for the forest.

REAL DIFFERENCES?

At first glance, the 217 actually seems to cost less than the 216. The unbundled price of the 217, at $3,495, is about $500 cheaper than the 216. However, the unbundled 217 doesn't give you a usable computer. HP refers to it as a "Modular Workstation" (the 216 is a "Personal Technical Computer"). To make the comparison reasonable, let's compare bundled systems. Here's what you get:

9816S Bundled System: 512k RAM
    nine-inch monochrome monitor
    RS-232 and HP-IB
    Basic 3.0
Total Price: $5,150

Substituting the large keyboard for the toy one (to make the comparison fair and the 9816 useful) costs an additional $215 for a total 9816 bundled price of $5,365.

9817H Bundled System: 512k RAM
    14-inch monochrome monitor
    a Twivel (tilt/swivel CRT mount)
    RS-232 and HP-IB
    no language
Total Price: $6,510

Spending the $1,145 extra buys you the following:

- a larger, cleaner looking CRT with significantly better graphics resolution;
- the new Human Interface Link (HP-HIL) keyboard;
- the capability of adding a mouse;

- an additional back-plane slot (although the 217 has six slots vs. two on the 216, two slots are used for the video card which drives the monitor and two are used for the 512k of RAM. The 216 needs no video driver and 256k of RAM is integral to the unit).

Not spending the $1,145 buys you the following:

- Basic;
- the old keyboard, with the Knob.

My personal reaction is ambivalent. Your reaction will probably depend upon your circumstances. How's your eyesight? I personally like small CRTs. I could even accept 80 characters on the seven-inch screen of the 9826 so the nine-incher on the 9816 doesn't bother me at all. The graphics resolution isn't drastically different (400 by 300 on the 216, 512 by 390 on the 217), but it is significant. How important is it to you?

Do you already have Basic? Are you willing to take the risk of the HPolice catching you using a copy of Basic on the Wrong Machine? (Hint: Many people are willing.) Do you want to learn a new keyboard? It may not be as easy as it seems. Do you love the Knob? Or do you want a mouse?

And, finally, do you need that extra interface slot? Prior to early 1984, when third parties announced megabyte boards, and mid-1984 when HP did likewise, this was the critical question. With the enormous size of Basic, you could just barely load it, never mind your application. Now the 216 can have 1.25M using just one accessory slot, leaving the second free for I/O or whatever.

It's not at all a clear decision. HP has a reputation for canny pricing policies and I would be surprised if the 217 weren't deliberately priced to keep life in the ol' 16.

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floppies. One is the system disk and contains the core of the language that is inserted when you boot the system. The other disks contain drivers (the code necessary to converse with peripherals) and language extensions such as matrix, graphics and program development commands.

While the usual exquisite documentation is supposed to be provided, my borrowed copy came with only the Basic 3.0 Users Guide and six sheets of paper listing the keywords and the version of the language in which each of them was introduced. Many of the new keywords are directly related to the new Basic format.

To conserve system memory, HP has made it possible to pick and choose which features of Basic you want to use. In addition to the core of the language, which is 276k, there are 13 driver binaries, for such standard devices as the external microfloppy drive and such exotica as the bubble memory, and 13 language extension binaries. All the binaries take up an additional 311k of RAM. New keywords support these binaries:

LOAD BIN	is finally programmable, instead of a command;
LIST BIN	shows which binaries are loaded;
RE-STORE BIN	re-stores binary files;
SCRATCH BIN	reduces the system to its core;
STORE SYSTEM	allows your configured Basic to be stored as a complete system so you don't always have to load the binaries;
SYSBOOT	permits rebooting from the keyboard without killing power.

Last column's prediction about a problem with the multi-binary scheme has come true. I said this would be a nuisance for program developers if they didn't supply an appropriately configured Basic with their programs. HP's demo disk has a chunk of programming devoted to determining whether the correct binaries have been loaded.

Writing this code is easy, but a waste of time. The cure is simply more memory. With denser boards available and prices coming down, most people will choose to load the whole binary suite at boot time.

Other new Basic features that I can deduce from the keyword list include the useful capability of using a file as the PRINTER IS or PLOTTER IS destination. There is a KNOBY statement to complement the KNOBX statement. This is presumably for use with the mouse, which rolls in two dimensions. MAXREAL and MINREAL return the floating point limits of calculation. PRINT LABEL and READ LABEL permit convenient manipulation of the VOLUME LABEL that appears in the catalog.

A new keyword in the Pdev binary, SECURE, appears to replace the utility of the same name in previous versions. It secures on a line-by-line basis and, like previous versions, should not be relied upon to prevent even a mildly determined hacker from recovering the program text.

There are a few more keywords and several redefinitions and additions to old ones. Space limitations preclude going into any more detail here.

THE HP MOUSE

The optional mouse replaces the standard Knob with the new keyboard. It works; at least on most surfaces such as hardwood, plastic, paper and smooth things in general. It doesn't work well on a rug or a woven place mat. It feels comfortable in the hand and use becomes instinctive after a minute or so.

Because it can move in X and Y directions, it replaces the Knob and the shift key. You can scroll vertically and horizontally with a flick of the wrist. HP wisely decided to prevent simultaneous scrolling in both directions. Presumably, the algorithm determines at what angle you are moving the mouse and translates the distance to the X or Y axis.

There is one major drawback. When scrolling through any but the shortest programs, it becomes necessary to lift the mouse repeatedly, shift it, then put it down again to get enough range. The Knob just keeps on turning.

OTHER NEW PRODUCTS

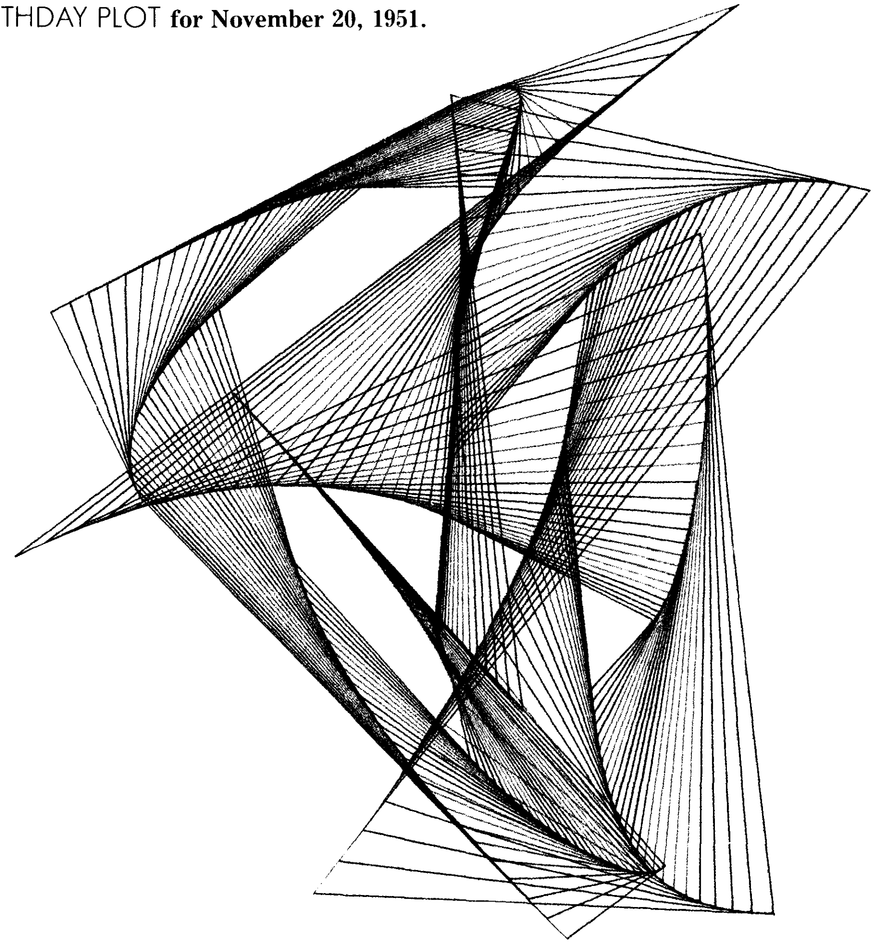
Pascal 3.0 is about to be released . . . Two new disk drives, at 24 and 55M, that have the performance of the 7911/12 series, but are of desktop size and about half the price, will soon be available . . . A cartridge tape backup with 67M capacity also has been announced.

All these devices are supported on the Series 200 and promise to enhance its capabilities. The long-awaited double-sided microfloppy replacement for the 9121 finally has been released (see cover story).

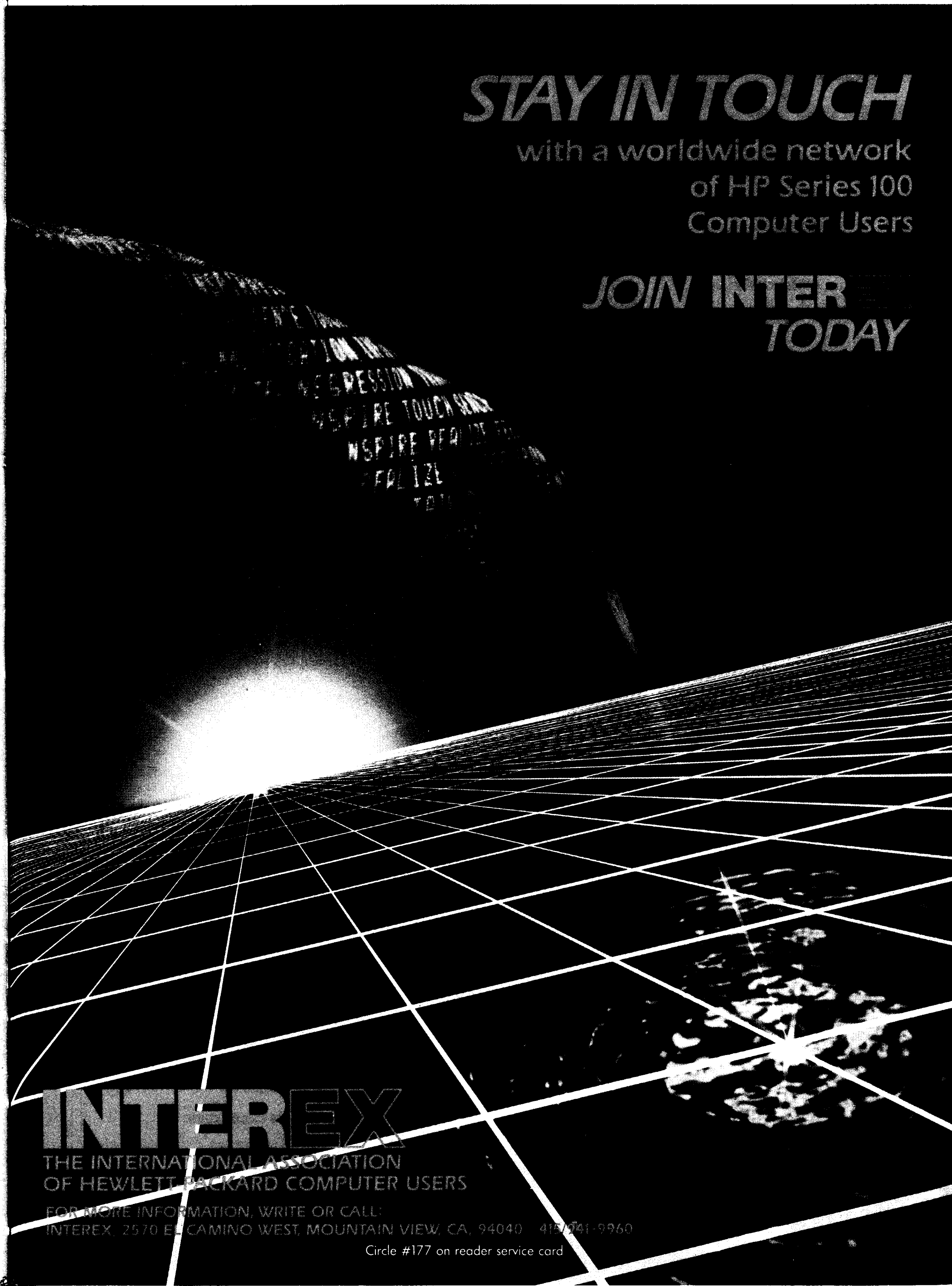
Next issue we'll have more information on these units and, hopefully, some experiences with the new Basic and Pascal to report. ☐

```
01LBL "BDPLT"
02 "BIRTHDAY?"
03 PROMPT
04 CLA
05 ENTER^
06 LN
07 7
08 -
09 .005
10 *
11 STO \
12 RDN
13 COS
14 ABS
15 STO [
16  E1
17 *
18 INT
19 5
20 +
21 2
22 *
23 4
24 +
25  E-3
26 *
27 5
28 +
29 STO 01
30 STO 02
31 .002
32 +
33 STO 00
34LBL 00
35 RCL [
36 9821
37 *
38 .211327
39 +
40 FRC
41 STO [
42 STO IND 02
43 ISG 02
44 GTO 00
45 RCL 05
46 STO IND 02
47 1
48 ST+ 02
49 RCL 06
50 STO IND 02
51 PINIT
52 .
53  E
54 .
55  E
56 SCALE
57 .004
58 STO 03
59 .004
60 STO 04
61LBL 01
62 RCL 00
63 PLREGX
64 RCL 01
65 STO 02
66LBL 02
67 RCL IND 02
68 CHS
69 RCL 02
70 2
71 +
72 RCL IND X
73 RCL Z
74 +
75 RCL \
76 *
77 ST+ IND 02
78 ISG 02
79 GTO 02
80 RCL 05
81 STO IND 02
82 1
83 ST+ 02
84 RCL 06
85 STO IND 02
86 ISG 03
87 GTO 01
88 .004
89 STO 03
90 90
91 ST+ ]
92 RCL ]
93 SIN
94 ABS
95 1
96 +
97 PEN
98 ISG 04
99 GTO 01
100 .
101 PEN
102 .END.
```

BIRTHDAY PLOT for November 20, 1951.



```
100 '  PRINT.BAS - PROGRAM TO PRINT MEMOMAKER FILES WITH ENHANCEMENTS
110 '
120 ' 6/15/84  BC   May be modified or copied for any noncommercial purpose
130 '
140 ' Initialize constants
150 FALSE=0:TRUE=NOT FALSE        ' logical constants
160 E$=CHR$(27)                   ' escape character
170 FF$=CHR$(12)                  ' form feed character
180 ' Prompt for inputs
190 PRINT:PRINT:PRINT "MemoMaker File Printer":PRINT
200 PRINT:INPUT "File to print > ",F$
210 IF LEN(F$)=0 THEN 970                    ' exit if no filename provided
220 ' Open input file and output device
230 ON ERROR GOTO 840                        ' file open error
240 OPEN "I",#1,F$                           ' open input file
250 ON ERROR GOTO 860                        ' any other errors
260 OPEN "O",#2,"PRN"                        ' open PRN for output
270 ' Ask about adding page numbers
280 INPUT "Print page numbers (Y/N) ? ",Y$
290 PGNUM=FALSE                              ' assume no page numbers
300 Y$=LEFT$(Y$,1)                           ' check only first character
310 IF Y$="Y" OR Y$="y" THEN PGNUM=TRUE
320 ' Initialize variables (change these to suit)
330 LPP=55                        ' number of line per page
340 CLINE=0                       ' current line counter
350 BOLD=FALSE                    ' BOLD mode flag
360 ULIN=FALSE                    ' UNDERLINE mode flag
370 PG=0                          ' page number
380 ' Constants for BOLD mode
390 BCODE=2                       ' internal code for BOLD is CTRL-B
400 BOLDON$=CHR$(14)              ' sequence to turn on printer BOLD
410 BOLDOFF$=CHR$(15)             ' sequence to turn off printer BOLD
420 ' Constants for UNDERLINE mode
430 UCODE=19                      ' internal code for UNDERLINE is CTRL-S
440 ULINON$=E$+"&dD"              ' sequence to turn on printer UNDERLINE
450 ULINOFF$=E$+"&d@"             ' sequence to turn off printer UNDERLINE
460 ' Main loop
470 IF EOF(1) THEN 910            ' end on end-of-file
480 LINE INPUT #1,L$              ' read input record
490 IF LEFT$(L$,1)="." THEN 740   ' test for "dot" command
500 L=LEN(L$)                     ' length of input record
510 FOR I=1 TO L                  ' loop for each character
520 C$=MID$(L$,I,1)               ' extract character in C$
530 C=ASC(C$)                     ' ASCII character code in C
540 ' Test for Bold on/off
550 IF C<>BCODE THEN 590
560 IF BOLD THEN PRINT#2,BOLDOFF$;:BOLD=FALSE ELSE PRINT#2,BOLDON$;:BOLD=TRUE
570 GOTO 640
580 ' Test for Underline on/off
590 IF C<>UCODE THEN 620
600 IF ULIN THEN PRINT#2,ULINOFF$;:ULIN=FALSE ELSE PRINT#2,ULINON$;:ULIN=TRUE
610 GOTO 640
620 ' Additional tests for embedded codes goes here
630 IF C>31 THEN PRINT #2,C$;     ' Print it if it's not a control char
640 NEXT I
650 ' End-of-line processing
660 PRINT #2,""                   ' add end-of-line sequence
670 CLINE=CLINE+1                 ' increment line counter
680 IF CLINE<LPP THEN 470         ' loop if there's more room on the page
690 IF PGNUM THEN GOSUB 1000       ' add page number at bottom
700 PRINT #2,FF$;                 ' skip to new page
710 CLINE=0                       ' reset line counter
720 GOTO 470
730 ' Dot command processor
740 IF LEFT$(L$,3)<>".PA" THEN 810     ' test for .PA command
750 IF PGNUM THEN GOSUB 1000            ' add page number
760 PRINT #2,FF$;                      ' skip to new page
770 CLINE=0                            ' reset line counter
780 IF LEN(L$)=3 THEN 470              ' if that's all, get next rec
790 L$=MID$(L$,4)                      '   else get rest of record
800 GOTO 500                           '   and print it
810 ' Tests for additional "dot" commands go here
820 GOTO 470
830 ' Error routines
840 PRINT:PRINT "** Can't open input file. **":PRINT
850 GOTO 200
860 PRINT:PRINT "** Unexpected error encountered **":PRINT
870 CLOSE #1
880 CLOSE #2
890 GOTO 200
900 ' End-of-file routine
910 CLOSE#1                       ' close input file
920 IF PGNUM THEN GOSUB 1000       ' add page number to end (if requested)
930 PRINT #2,FF$;                 ' skip to new page
940 CLOSE#2                       ' close printer
950 GOTO 200                      ' start over
960 ' End-of-program routine
970 ON ERROR GOTO 0               ' clear error flag
980 PRINT:PRINT "* DONE *":PRINT  ' signoff message
990 END
1000 ' Page number rountine
1010 FOR I=CLINE+1 TO LPP+2        ' space to end of page
1020 PRINT #2,""
1030 NEXT I
1040 PG=PG+1                      ' increment page number
1050 PRINT #2,"                             ";PG
1060 RETURN
```



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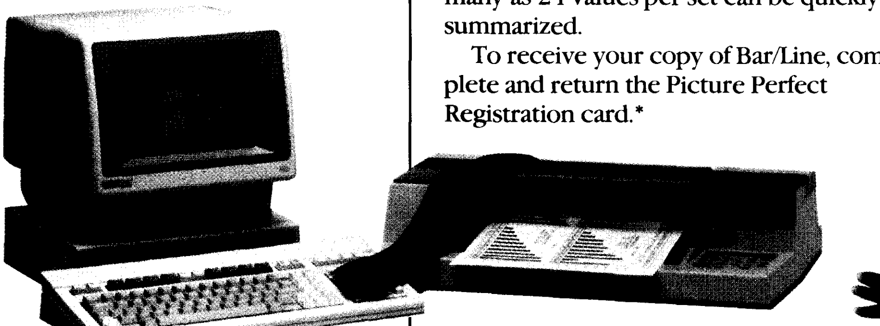

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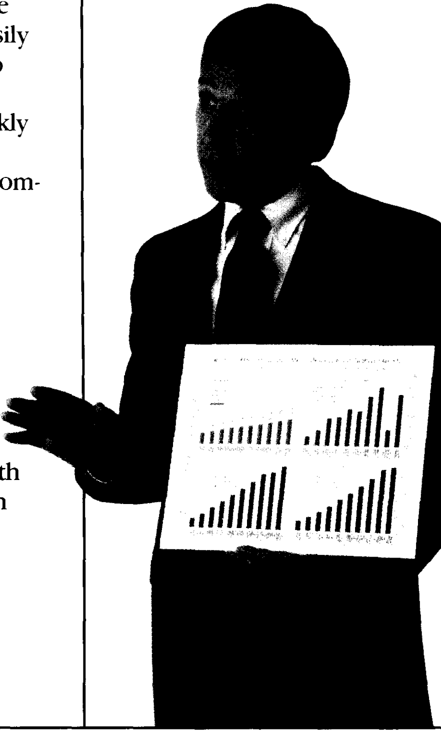

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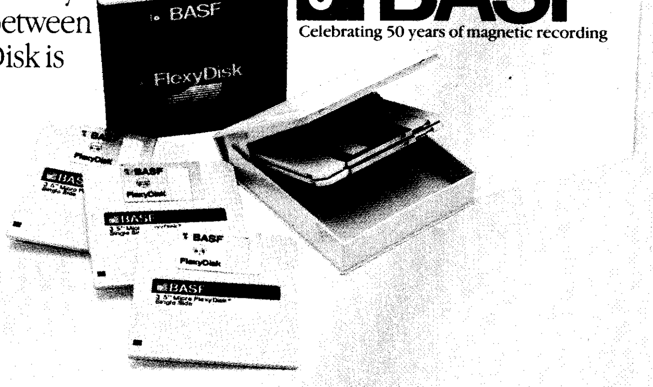

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